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REPORT RESUMES

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COMPARISONS OF THE READING AND SPELLING ACHIEVEMENT AND QUALITY OF HANDWRITING OF GROUPS OF ENGLISH, SCOTTISH, AND AMERICAN CHILDREN.
BY- ANDERSON, IRVING H. AND OTHERS
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DESCRIPTORS- *READING COMPREHENSION, *SPELLING, *HANDWRITING SKILLS, COMPARATIVE ANALYSIS, TEST RESULTS, *COMPARATIVE EDUCATION, ANN ARBOR, MICHIGAN, STANFORD ACHIEVEMENT TESTS, METROPOLITAN ACHIEVEMENT TEST, METROPOLITAN HANDWRITING SCALE

A COMPARISON WAS MADE OF THE PERFORMANCE OF GROUPS OF ENGLISH AND SCOTTISH CHILDREN WITH AMERICAN NORMS AND WITH THE PERFORMANCE OF SIMILAR GROUPS OF AMERICAN CHILDREN ON A SERIES OF READING AND SPELLING TESTS AND A HANDWRITING SCALE STANDARDIZED IN THE UNITED STATES. SCORES ATTAINED ON THE PARAGRAPH MEANING AND WORD MEANING SUBTESTS OF THE STANFORD ACHIEVEMENT TEST, THE SPELLING TEST FROM THE METROPOLITAN ACHIEVEMENT TEST (1947 ED.), AND THE METROPOLITAN HANDWRITING SCALE PROVIDED THE BASIS FOR COMPARISON. THE DATA WERE ANALYZED FOR COMPARISONS OF CENTRAL TENDENCY OF TOTAL SAMPLES, VARIANCES OF TOTAL SAMPLES, CENTRAL TENDENCY OF BOYS AND GIRLS, AND FOR SPELLING ERRORS. A DETAILED DISCUSSION OF EACH OF THESE COMPARISONS IS INCLUDED. (HS)

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Comparisons of the Reading and Spelling Achievement and Quality of Handwriting of Groups of English, Scottish, and American Children

COOPERATIVE RESEARCH PROJECT NO. 1903

Project Director and Principal Investigator **IRVING H. ANDERSON**

Research Associates

GERALDINE T. SCHOLL
W. ROBERT DIXON
CARL R. PERSONKE
RAYMOND P. PETERSON
SYLVIA H. KINNUNEN

THE UNIVERSITY OF MICHIGAN

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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The University of Michigan
Ann Arbor, Michigan

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CHAPTER I

INTRODUCTION

Problem

The research submitted in this report is concerned with a comparison of the reading and spelling achievement and quality of handwriting of groups of English, Scottish, and American children. The purpose was to obtain evidence in relation to the following differences in educational practice:

1. English and Scottish children are normally introduced to reading at the age of 5-plus, while American children are usually first exposed to reading instruction at the age of 6-plus. The teaching of spelling and handwriting is also started about a year earlier in English and Scottish schools than in American schools.

2. English and Scottish schools normally remain in session for 40 weeks a year or 200 days. The length of the school year in the United States is typically 36 weeks or 180 days.

3. English and Scottish schools tend to give somewhat more attention to phonics in beginning reading than do most American schools. An examination of the beginning readers which are in popular use in Great Britain is enlightening in this connection. A number of these consist of adaptations of American readers. The British version of these books incorporates special provisions for the application of phonics to reading which the American editions do not include, except as suggestions in the teacher's manuals. Scottish schools, in particular, are likely to give

somewhat greater prominence to phonics in beginning reading than most American schools (Russell, 1957). Moreover, the time allotted to reading in the infant division of many Scottish schools is for the most part devoted to oral reading, especially in the case of the poorer readers (Inglis, 1948). The trend in the United States has been to increase the time devoted to silent reading, even in beginning reading.

4. English and Scottish pupils are also likely to encounter somewhat more difficult beginning reading material than American children. Perhaps the best indication of the difference here concerns the ratio of new words to running words. A comparison of several of the most popular series of beginning readers found in each country reveals that the ratio is 1 to 10 in the English and Scottish series and 1 to 25 in the American series. The English and Scottish series obviously move at a more rapid pace and hence pose greater difficulty to the child. American basic readers tend to be thicker without necessarily introducing a larger number of different words, indeed if as many. They just manage to pack in more repetition per word.[1]

5. The assessment which occurs at age 11-plus in English schools is unfamiliar in American education. This assessment typically involves a test of intelligence and tests of attainment in English and arithmetic. In most instances the results determine whether a child will be admitted to a college preparatory curriculum and ultimately to a university. In view of the importance of the 11-plus assessment, it seems safe to say that it gives the children a special incentive to excel in their elementary school work, particularly from the commencement of the penultimate year. It must also encourage schools to concentrate more intensively on the achievements sampled by the 11-plus assessment (Anderson, 1958). A transfer examination similar to the 11-plus assessment in English

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[1] Evidence of these differences is reported in detail in Appendix A.

schools occurs in Scottish schools at about age 12.

Some observers insist that the above differences in practice give English and Scottish pupils an advantage. Flesch (1955), for example, contends that English children gain a year in reading achievement by being introduced to reading at 5 rather than 6. Flesch also asserts that American children lose another year by not being taught by the phonetic method, but he offers no acceptable evidence to support his contentions. The present investigation was primarily designed to ascertain whether English and Scottish children actually gain the advantages attributed to them by Flesch and other critics. Writing and spelling have been included in the investigation, since the ability to write and spell is commonly developed simultaneously with the ability to read.

Significance of the Problem

An investigation of the above problem is timely for several reasons. Writers other than Flesch have maintained that a year could be saved by introducing American children to reading at the age of 5. The year in kindergarten is regarded by some writers as a year wasted because it is not used to teach children to read (Simmons, 1960). In Denver, a program has been established to teach children to read at home before they enter school (Newsweek, 1962). The assistance of parents has been enlisted in this program. Some preschool children learn to read at home without the intervention of the parents. They pick it up on their own. Writers on the subject of teaching 5-year-old children to read use this as evidence that children are capable of learning to read at this age (Durkin, 1959). However, children who learn to read at these early ages are typically mentally superior (Anderson, 1961). It remains to be demonstrated that children in general would derive any lasting benefit by being introduced to reading at 5 rather than 6. Expressions of support for a longer school year are part and parcel of the same movement designed to speed up instruction in American schools.

Another wide-spread belief is that American schools should place greater stress on phonics in beginning reading. The writers who have taken exception to current methods of teaching reading in the United States are legion. The popular demand is for more and better phonics. Apropos of this clamor, a new series of readers called the Royal Road Readers (Daniels and Diack, 1954) appeared on the English market a number of years ago. These readers apply phonics and they have found some favor in England, especially in remedial reading. Upon his discovery of these readers, one American commentator (Adler, 1957, p. 215) has been prompted to write: "American reading specialists and publishers of educational materials would do well to get acquainted with these materials and the method upon which they are based. The publisher who first adopts them for use with the American idiom will take the country by storm." This may be true, but would the children learn to read any better?

Hypothesis

The design of this study calls for a comparison of the performance of groups of English and Scottish children with the American norms and with the performance of similar groups of American children on a series of reading and spelling tests and a handwriting scale standardized in the United States. The study was limited to the approximate ages 7, 11, and 14. It is hypothesized that large differences of long-term duration will not appear in favor of English and Scottish children, even though they begin their primary education about a year earlier than American children and receive a program which is probably somewhat more formal and academic than the program usually found in American schools. This hypothesis is predicated on the proposition that learning to read, write, and spell is more a matter of development than of formal instruction and that any gain derived from advancing the age of beginning instruction and a concentration on academic learning will be short-lived and limited in size.

Additional Objectives

Advantage was taken of the data collected to investigate such additional questions as:

1. How do the variances of the national samples compare at each age on each test?

2. How do the boys and girls within the national samples compare on the average at each age on each test?

3. How do the variances of the boys and girls compare at each age on each test?

4. How do the spelling errors of the national samples compare at each age?

The analysis of the data according to sex should be of particular interest. Studies of American children have consistently revealed that age for age during the early years girls tend to excel boys in reading achievement. It is well known that the incidence of reading disabilities is greater among American boys than among American girls. American writers are disposed to attribute these differences to the proposition that girls mature more rapidly than boys and hence become ready for reading sooner.

Differences in favor of girls have also been disclosed in surveys of the reading attainment of English children, but apparently not with the same consistency as found in American studies. In several of the English surveys (Ministry of Education, 1957) the boys appeared to have the higher standard. Reviewing these findings, one English investigator (Morris, 1959) has ventured the opinion that the test content may have favored the boys in these cases. It is also possible that the same differences between the reading achievement of boys and girls do not occur in England (and in Scotland) as in the United States. Differences between the reading achievement of boys and girls apparently can involve factors other than maturity. Using 4th and 6th grade pupils as subjects, Preston (1961) has found that in Germany boys tend to be better readers than girls and that German girls are more often retarded in reading than German boys. This finding suggests that there may be cultural expectations in Germany which identify reading with the male, whereas American culture may tend to associate reading with femininity (Mazurkiewicz, 1960). The same may or may not be true in England and Scotland. An analysis of the data by sex, therefore, could be suggestive in terms of a cultural variable.

The analysis of the data by sex might also shed light on the problem of the relationship between developmental and instructional factors in learning to read, write, and spell. There is reason to believe that the so-called readiness approach or individualized plan of reading instruction tends to maximize differences in reading achievement which can be attributed to differences in maturity (Anderson, Hughes, and Dixon, 1956). Since girls tend to mature more rapidly than boys, it may be that larger differences in reading achievement in favor of girls will occur when this approach is used than when more formal and systematic methods are employed. While by no means all American schools pursue the individualized plan of teaching reading or are equally permissive in their approach, it is probably still true that methods of teaching reading in English and Scottish schools in general are somewhat more formal and demanding than those usually found in American schools. This is another reason why the same sex differences in reading achievement may not be found in England and Scotland as in the United States. This hypothesis may also be applied to sex differences in spelling achievement and quality of handwriting.

For the same reason that practices in American schools may tend to maximize sex differences in learning to read, write, and spell, they may have a tendency to exaggerate individual differences in these skills. This problem was investigated by comparing the variances of the national samples at each age on each test. This study of variances included a comparison of the variability of the boys and girls within the national samples at each age on each test. Judging from previous work, it will not be surprising if our findings show that boys tend to be more variable than girls, although it remains to be seen how boys and girls will in fact compare in this regard under the conditions of the present investigation.

The analysis of the spelling records included a comparison of the spelling errors of the national samples at each age. This aspect of the investigation should be instructive, especially with reference to the application of phonics to spelling. While the method of attack cannot be identified when words are spelled correctly, errors on unknown words often indicate the attack used. Since English and Scottish schools may give somewhat more attention to phonics than American schools, it is possible that English and Scottish children will make a larger proportion of errors caused by spelling words the way they sound than will American children. Since such misspellings are by nature easier to understand than nonphonetic errors, the mistakes of English and Scottish children may also constitute less of a barrier to communication than those of American children. The real heroes of the comparisons which were made in this connection were the clerks who tabulated the spelling errors. That they were able to complete the task is a tribute to their fortitude.

Organization of Report

This research divides itself into two components. One is identified with the English samples, the other with the Scottish samples. The two studies cannot be amalgamated because the conditions vary. Parallel accounts will be given, therefore, of the work accomplished in each case. The Scottish component has been given top billing, because Scottish schools tend to remain rather formal and academic even by English standards (Vernon, et al., 1955). It may be, therefore, that Scottish educational practices present a sharper contrast with practices in the United States than do those of English schools. From that standpoint, the Scottish study is the key component. The next chapter, then, is addressed to the source of the Scottish samples.

U. S. OFFICE OF EDUCATION
Cooperative Research Branch

Project Description

1903 Comparison of the Reading, Writing, and Spelling Achievement Among Groups of English, Scottish, and American Children

Irving H. Anderson, Professor of Education, University of Michigan
April 1963-March 1964
$33,509

Objective

Children in England, Scotland, and the United States will be compared on the following basis:

1. reading, writing, and spelling achievement
2. spelling errors
3. individual items on reading and spelling tests
4. variability on achievement tests
5. variability of sexes on achievement tests

Procedure

The studies will be based on a battery of American reading, writing, and spelling tests administered to groups of children aged 7, 11, and 14. The samples were obtained in Leeds, England, West Lothian County, Scotland, and Jackson, Michigan. The mean scores of the boys and girls on each test will be compared by age and by country. Individual items on the reading and spelling tests will be analyzed by age, by sex, and by country, including study of the most frequent wrong answers on multiple-choice tests. The results obtained will be analyzed in relation to variations in the national cultures and to differences in educational practices such as starting age for reading training and the use of phonics.

CHAPTER II

SOURCE OF SCOTTISH SAMPLES

West Lothian County

GENERAL INFORMATION

There are four city and 31 county Education Authorities in Scotland. The 31 county units include two combined districts. The four cities are Aberdeen, Dundee, Edinburgh, and Glasgow. None of the city units is wholly representative of Scottish intelligence and attainments. Three are distinctly above the British norms on mental and attainment tests and one is distinctly below. Furthermore, the majority of the fee-paying and private institutions are located in these cities. There are other large centers of population outside these four cities, but *the mental and achievement test performances of pupils in these centers* are usually combined with those of the other pupils in the county. These considerations led to the choice of one of the counties as the source of the Scottish samples. The county chosen was West Lothian County. West Lothian combines four large communities with a number of smaller settlements and considerable rural area. It thus offers the opportunity to test in different situations within the same administrative unit.

Location. Geographically, Scotland has three main regions, each possessing a distinct character. To the north lie the Highlands with a scattered population and much uncultivated land owing to mountains and moors; to the south lie the Southern Uplands noted for sheep farming and the woolen textile industry; and between these regions lie the Central

Lowlands, the most highly industrialized as well as the most populous region. Approximately 2/3 of the population of Scotland reside in the Central Lowlands which comprise only about 1/10 of the total area of Scotland. West Lothian County is located in the Central Lowlands, west of Edinburgh on the southern shores of the Firth of Forth. West Lothian is thus located in the most densely populated region of Scotland, lying between Edinburgh and Glasgow.

Population. Scotland had a population of 5,178,480 in 1961. Of this total, about 38% lived in the four principal cities. The population of West Lothian in 1961 was 92,764, or about 1.8% of the national total. West Lothian's population increased by 4.7% from 1951 to 1961. The population of Scotland as a whole increased by only 1.6% over the same period. In fact, the population of Scotland has shown but slight increase for the past half century. This condition is attributed to the emigrating nature of the Scots rather than to a declining birth rate (Reid, 1959). The 1951 Scottish census placed the birth rate among women aged 15-44 in West Lothian at 157.5 per thousand and in Scotland as a whole at 148.4 per thousand. The percentage of native born is also fairly high in West Lothian. The 1951 Scottish census reported that 94.7% of the people living in West Lothian in that census year were born in Scotland as compared with 92.1% of the general population.

Social class. West Lothian is one of the moderately industrialized areas of Scotland and is populated predominantly by people of the working class. More than 1/4 of the employed population of West Lothian are engaged in the mining industry, principally of coal and oil shale, although the latter industry is declining rapidly (West Lothian County Council, 1958). Mining occupies about 5% of the working population of Scotland as a whole.

The manufacturing industries of West Lothian include iron, steel, and brass foundries, hosiery making, fireclay works, and distilleries.

About 31% of the employed population of West Lothian are engaged in some form of manufacturing. The working population of Scotland at large includes 39% who are so employed. West Lothian is currently experiencing some unemployment due to a decline in opportunities for employment in the mining industry, notably in shale.

White collar and professional groups comprise a comparatively small percentage of the employed population of West Lothian. The 1951 Scottish census classified 9.4% of the employed male population of West Lothian in these groups. Of employed males in Scotland in general, 16.1% were so classified.

Although West Lothian includes considerable rural area, less than 3% of the working population are engaged in agriculture. Agriculture employs less than 5% of the total working population of Scotland (West Lothian County Council, 1958).

West Lothian County Education Authority

EDUCATION IN SCOTLAND

The Scots have a long tradition of public education and pride themselves on the quality of their educational system. The central authority for education is the Scottish Education Department under the direction of the Secretary of State for Scotland who is directly responsible to Parliament. As reported before, there are 35 Local Authorities with responsibility for making adequate provision for the educational needs in their areas. The functions of the Local Authorities also include the medical inspection of the children, provision for milk and midday meals, conveyance of children living a distance from school, and award of bursaries covering both school and post-school studies.

Types of schools. Schools in Scotland are of three types: public schools managed by the Local Authority, grant-aided schools conducted by bodies of voluntary managers but which receive grants for their support from public funds, and independent or private schools which receive no assistance from public funds. In January, 1961, there were 3,301 public and grant-aided schools attended by 886,918 students comprising 97.8% of the total number of students receiving an education (Scottish Education Department, 1962).

Primary education includes nursery schools in some areas for children under 5, but for whom attendance is not compulsory; and primary schools in all areas for children from age 5 to about age 12 (Primary I-VII). Attendance is compulsory from age 5.

Two types of secondary education are provided: Junior Secondary Schools with courses lasting 3 years to the school leaving age of 15; and Senior Secondary Schools with courses extending from 5 to 6 years for those who wish to remain in school until age 17 or 18. Students in the Senior Secondary Schools are prepared for presentation at the Scottish Certificate of Education Examination which is administered by the Scottish Education Department. Children are allocated to the secondary program according to their fitness to profit from the type of education offered. As a rule, the factors on which this decision is based are teachers' scaled estimates and the results of intelligence and attainment tests. However, the actual number of factors taken into account is not the same in all areas. Some regard is also paid to the wishes of the parents. The transfer of pupils from primary to secondary schools occurs generally between the ages of 11 1/2 and 12 1/2 years.

School year. Schools are in session for a minimum of 200 days a year or 40 weeks. The school year consists of three terms: autumn term running roughly from the beginning of the last week of August to Christmas; spring term covering as a rule the period from the first week of January to Easter; and summer term extending usually from Easter to the end of June or early July. The school day is typically 5 1/2 hours long.

Teacher certification. To be qualified, teachers in Scotland must hold a certificate awarded on successful completion of a course of professional training. In addition, except in the case of specialist teachers of art, music, physical education, and technical subjects, men teachers must possess a university degree (Whitaker, 1961). Professional training is obtained at a college of education. The period of training is 1 year for those holding a university degree and 3 years for non-university students. There are also courses of 2 years' duration for certain categories, e.g., teachers of technical subjects. During the 1960-61 session, there were 36,260 certificated teachers in employment in Scotland. In October, 1961, 36.4% of the total number of teachers and 15.1% of the primary teachers in Scotland were men (Scottish Education Department, 1962).

EDUCATION IN WEST LOTHIAN

Number of schools. The educational system of West Lothian conforms to the generally accepted pattern of organization for Scotland as a whole. During the 1961-62 session, the number of schools in West Lothian totaled 47, excluding one small private or independent school. There were 31 primary schools; 10 primary and junior secondary schools combined; 5 junior secondary-senior secondary schools combined; and 1 wholly senior secondary school. All were mixed schools, enrolling both boys and girls. Two of the primary schools were one-teacher schools and a total of 7 primary schools did not provide a complete primary program through Primary VII. Primary divisions ranged in size from 24 to 874 pupils with a total of 11,334; junior secondary divisions ranged from 97 to 476 with a total of 3,907 pupils; senior secondary divisions ranged from 184 to 530 with a total of 2,227 pupils. There were facilities available in evening continuation classes for technical or professional education. Provision for such education at more advanced levels is made by the West

Lothian Education Authority by arrangement with the Edinburgh Education Authority and other areas.

Operation of schools. Children are assigned to schools according to the geographical location of their homes. New admissions are accepted in the infant divisions (Primary I) in late August provided children are 5 years old by December 1, and again at the beginning of the summer term for those who become 5 during the interim. Headteachers also have discretionary powers to admit new entrants in January, but admissions at this time are rare. The school day for infants (Primary I-II) usually lasts 4 1/2 hours; the school day for all other pupils is normally 5 1/2 hours long. All subjects are taught by the same teacher in the primary departments, except as the services of special teachers of art, music, and needlework are sometimes utilized. In general, teachers remain with a class for the entire session. In the junior secondary and senior secondary divisions, subjects are taught by different teachers according to area of specialization. Because of a teacher shortage, it has become necessary for many Local Authorities to employ uncertificated teachers. During the 1960-61 session, 8.5% of the teachers in West Lothian and 5.5% of all of the teachers in Scotland were uncertificated (Scottish Education Department, 1962). During the same session, the pupil-teacher ratio was 22.9 to 1 in West Lothian and 23.1 to 1 in Scotland as a whole. West Lothian has, therefore, a favorable pupil-teacher ratio.

Transfer examination. As is customary in Scotland, a Transfer Board consisting of the Director of Education and of teachers and members of the West Lothian Education Committee supervises the allocation of pupils to secondary programs. This Board periodically reviews and, subject to the approval of the Secretary of State, revises the transfer procedures. During the 1960-61 session, the examination for transfer to the secondary program consisted of the Moray House Attainment Tests in English and Arithmetic, two additional papers in problem arithmetic and composition, the Moray House Verbal Reasoning Test, and the headteachers' scaled estimate based on previous school records of attainment in school subjects. Parents were also asked to indicate their preference as to the child's placement. All parents in Scotland who are dissatisfied with the decision made by the Transfer Board with regard to the placement of their children in secondary schools have the right to appeal in the first instance to the Board and ultimately to the Secretary of State (Scottish Education Department, 1962). Roughly 1/3 of West Lothian children are assigned to senior secondary schools on the basis of the transfer examination. This is comparable to the national rate of transfer to senior secondary programs.

School leavers. The drop out rate at the school leaving age of 15 is fairly high in West Lothian. During the 1960-61 session, 70.9% left school at this age in West Lothian, while nationally 66.9% ceased their education at this point (Scottish Education Department, 1962). During the same session, 11% of West Lothian students completed the 5 year secondary program as compared with 14% across the nation. During the 1960-61 session, 12.5% of children aged 15-17 were enrolled in school in West Lothian while 19.[illegible]% of the total juvenile population in Scotland were attending school (Scottish Education Department, 1962). These statistics reflect the fact that the population of West Lothian is composed predominantly of working class families.

Teaching of Reading, Handwriting, and Spelling in West Lothian

READING

From the beginning, children attend school both forenoon and afternoon. At stages Primary I and II, however, the afternoon session is curtailed by 1 hour to make a school day of 4 1/2 hours. West Lothian teachers are urged to postpone formal reading instruction for at least a month to give the child an opportunity to adjust to school. However, practices in this regard vary from school to school and it is probably safe to say that reading instruction in West Lothian is generally begun during the first weeks of school.

Attention paid to readiness and readiness activities also varies from school to school. The Scottish Education Department recognizes the value of readiness activities, but indicates that in general insufficient time is allowed in Scottish infant schools for prereading experiences. West Lothian primary teachers are provided with a syllabus which outlines suggested language activities and other readiness-type activities to be used before reading is introduced. This syllabus is not altogether binding on the heads of schools. The degree to which it is followed in detail, therefore, varies somewhat from school to school.

Reading appears on the teachers' time-tables under a variety of titles, such as dramatization, poetry, library, and the like. Because reading pervades so much of the school day, it is difficult to specify the exact amount of time allotted to it. In general, it may be estimated that as many as 5 or 6 hours a week are devoted to reading in one way or another.

Scottish schools have traditionally stressed phonics in beginning reading (Inglis, 1948; Luke, 1931). The trend more recently, however, has been to recommend the introduction of reading by the whole-word or look-and-say method with phonics introduced later (Scottish Education Department, 1955). Regular and systematic exercises in phonics are recommended for pupils in Primary II, which is considered the stage at which such instruction will have the greatest value because pupils feel a need at this point for phonics when confronted with unfamiliar words.

West Lothian teachers are urged to incorporate and adapt the look-and-say, sentence, and phonic methods to suit their requirements. Phonic exercises are introduced after the child can read words and sentences by the look-and-say method with ease and when he has become word conscious and interested in sounds. In actual practice, West Lothian teachers seem to follow the general procedure of introducing reading by the look-and-say method, but vary as to the point at which they introduce phonics. Some introduce phonics at once and others postpone it for almost a year.

Oral reading is stressed particularly at the early primary level and is considered the procedure through which the pupil acquires the techniques of reading and by which the teacher can assess progress. By the time the child leaves the infant department (Primary II), he is expected to read aloud with fluency passages from books suitable to his age.

Once the pupils have mastered the mechanics of reading, increasing attention is given to silent reading and to the interpretation of what is read. The study type of silent reading is also introduced at this time. Three types of study reading are recognized: reading for detailed comprehension; reading for general comprehension; and reading for specific items of information.

In West Lothian, at least one period a week is devoted to reading for recreation. The child selects his own material to read from the class or community library. The teacher is encouraged to show sympathy for the child's taste, but gradually to guide him to books of better quality.

The most commonly used readers in West Lothian for regular reading instruction include: Happy Venture Reading Books, Vanguard Readers, and Janet and John in Primary I and II; and Radiant Readers, Wide Range Readers, and First Aid Readers in Primary III through VII. These are familiar titles to primary teachers throughout Scotland. The series known as Janet and John consist of an adaptation of an American series called The Alice and Jerry Books. The names of the characters have been changed and it may not be an accident that both begin with the same initial consonant.

For retarded readers, teachers are urged to provide simpler books and special instruction in small groups. A Reading Laboratory was recently introduced in two schools on an experimental basis to meet the needs of retarded readers. Otherwise, except in one school, no special remedial reading program existed in West Lothian, although in a number of the larger primary schools there are Adjustment Classes for pupils who are generally backward.

HANDWRITING

Writing activities are generally introduced in West Lothian from the first weeks in school. All children are expected to be writing by the second month of the second term. Manuscript writing is employed at the start. The transfer to cursive writing is made in Primary II or III. A commercial system is not utilized. Instead, the teacher employs a model acceptable to the headteacher of the school. The model employed may vary in minor respects from school to school, but tends to be uniform within a school. Italic or calligraphic writing has been introduced recently on an experimental basis in a few schools in the county. The instructional activities throughout the primary school include writing in copybooks from the blackboard, from dictation, and from printed materials. This practice is thought to improve the child's habits of studying words, in addition to providing gains in handwriting skills. From the beginning, reading and writing are linked together and one is used to support the other.

About 2 1/2 hours per week (30 minutes a day) are typically devoted to handwriting in the infant division. The amount of time allotted to handwriting as a skill diminishes after the child leaves the infant division and may be reduced to as little as 45 minutes a week by the time the child reaches Primary VII. However, emphasis is placed on good handwriting in all written work throughout primary school. No time is reserved for handwriting as such after the child leaves primary school and enters secondary school.

SPELLING

The West Lothian Education Committee Scheme of Work suggests that no formal spelling be taught in Primary I or II. Formal spelling, therefore, is usually introduced in Primary III or at about age 7. As a rule, 5 or 6 new words per day are taught at the lower levels, with the number increasing to 10-15 per day in Primary VI and VII. The most commonly used word lists in West Lothian are the Essential Spelling List (Schonell, 1960) and New Standard Spelling List (Boyd, 1956). Every child has a spelling book. Spelling lessons also include common words misspelled in compositions and proper names associated with other school subjects. The spelling lessons include a fair amount of drill. In addition, words are taken home at night to be studied and class time is also devoted to testing. On the whole, about 20 minutes per day are spent on spelling beginning with Primary III. However, spelling is introduced informally before Primary III, especially in conjunction with writing activities. West Lothian children write a lot, much of it in the copybooks they keep. Considerable stress is placed on accurate spelling and good handwriting in these copybooks. Since many spelling errors are really handwriting errors, this stress on legible handwriting tends to minimize poor handwriting as a source of error.

Intelligence and Attainments of West Lothian Children

MENTAL SURVEY OF 1947

In 1947 the Scottish Council for Research in Education conducted a survey involving the administration of a group test of intelligence to virtually the whole population of 11-year-olds attending schools in Scotland (Scottish Council for Research in Education, 1958). The test included both picture and verbal items. The object of the picture items was to spread out the children who obtained very low scores on the verbal items. The verbal items, therefore, constituted the substance of the test. A maximum score of 76 was possible on the verbal items. As shown in Table 1, the West Lothian mean on the verbal test did not differ significantly from the Scottish mean in general. This survey followed a similar assessment conducted in 1932 utilizing the same test (Scottish Council for Research in Education, 1933). West Lothian was equally representative of Scotland in 1932. The difference between means at that time was .17 in favor of West Lothian.

TABLE 1

COMPARISON OF WEST LOTHIAN AND SCOTLAND
ON 1947 SCOTTISH MENTAL SURVEY

No.	West Lothian Mean Verbal Score	Scotland Mean Verbal Score	sd	Difference	z
1000	36.80	36.70	16.04	0.10	.20

It would not be out of place at this point to insert a note regarding the statistical tool applied in Table 1. Throughout this work, to make a test of the significance of the differences between mean scores of a sample and a population or norm when the standard deviation of the population or norm is known, the z statistic or normal distribution of such differences was used (Dixon and Massey, 1957, pp. 112-3). Asterisks are used to denote the significance of the differences. A single asterisk identifies a difference which is significant at the 5% level and a double asterisk one which is significant at the 1% level. The absence of an asterisk means that the required level of significance has not been reached. The same convention applies to the t statistic used later in many comparisons of sample means. Interpretation of a significant statistic should always be done with reference to the sign of the difference.

To get back to the main business, the Stanford-Binet Scale, 1937 Revision, was administered to a representative sample of 1,215 of the children in the 1947 survey enabling the investigators to compare scores on the verbal test with Stanford-Binet IQ's. The regression of IQ on verbal score was calculated to permit estimates of the mean IQ's from the mean verbal test scores. When this transformation was made by an application of the regression equations, the results shown in Table 2 were obtained.[1] These results speak for themselves, insofar as their application to the present investigation is concerned.

TABLE 2

MEAN ESTIMATED IQ'S OF WEST LOTHIAN AND SCOTTISH CHILDREN IN 1947 SCOTTISH MENTAL SURVEY

	Mean Verbal Score	Mean Estimated Stanford-Binet IQ's	
		Boys	Girls
West Lothian	36.80	100.9	98.9
Scotland	36.70	100.8	98.7

SCHOLASTIC SURVEY OF 1953

In 1953 the Scottish Council for Research in Education conducted a survey of the school attainments of 10-year-old children in Scottish schools (Scottish Council for Research in Education, 1963). The tests employed sampled achievement in the following areas: Mechanical arithmetic, arithmetical reasoning, English usage, and English comprehension. Table 3 reports the comparisons of West Lothian with Scotland as a whole. These results show that in three of the four tests the differences between the West Lothian and Scottish means were not significant.

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[1] These equivalents were obtained through the courtesy of Dr. David A. Walker, Director of the Scottish Council for Research in Education.

TABLE 3

COMPARISON OF WEST LOTHIAN AND SCOTLAND
ON 1953 SCOTTISH SCHOLASTIC SURVEY

Test	West Lothian			Scotland			Difference	z
	No.	Mean Score	sd	No.	Mean Score	sd		
Mechanical Arithmetic	1412	13.01	7.93	72491	12.61	7.94	0.40	1.90
Arithmetic Reasoning	1412	10.20	8.97	72487	10.02	8.95	0.18	.75
English Usage	1399	53.95	23.34	72416	52.50	23.73	1.45	2.32*
English Comp.	1399	21.46	13.53	72407	21.31	13.57	0.15	.41

On the test of English usage, the difference in favor of West Lothian is statistically significant, but small. All in all, the West Lothian results were not seriously out of line with the national averages.

Summary

The salient facts regarding West Lothian County as the source of the Scottish samples may be summarized as follows:

1. West Lothian is located in the most densely populated region of Scotland.

2. West Lothian is one of the moderately industrialized areas of Scotland.

3. West Lothian is predominantly working class.

4. West Lothian is currently experiencing some unemployment which is due mainly to a decline in opportunities for employment in the mining industry.

5. The educational system of West Lothian conforms generally to the pattern of organization for Scotland as a whole.

6. The percentage of uncertificated teachers in West Lothian is slightly larger than in Scotland as a whole.

7. West Lothian enjoys a favorable pupil-teacher ratio.

8. West Lothian employs a transfer examination for promotion to the secondary program as is the case in other counties.

9. Compared with the national average, West Lothian has slightly lower percentage of pupils remaining in school after the leaving age of 15.

10. Practices in the teaching of reading, writing, and spelling in West Lothian are similar to practices employed in Scotland as a whole.

11. Oral reading is stressed particularly during the early years in school.

12. The basic readers and spelling lists used in West Lothian are the same as those available to primary schools in the rest of Scotland.

13. Mental and scholastic surveys have shown that West Lothian is reasonably representative of Scottish intelligence and attainments.

CHAPTER III

PROCEDURE IN WEST LOTHIAN

Selection of Samples

AGES CONCERNED

The West Lothian samples were obtained by testing whole classes in a variety of schools in the county. The grade levels included were Primary III, Primary VII, and Secondary III. These grades correspond roughly to the ages 7, 11, and 14 and capture the children at strategic points as they advance through school. By age 7 or 7-plus, the children have had enough exposure to reading, writing, and spelling to make reliable measurements of these skills possible. Comparisons with the norms on American achievement tests would be precarious before this age, especially as American children begin their primary education about a year later than Scottish children do. At age 11, Scottish children are in their last year of primary school with the transfer examination in prospect. At age 14, Scottish children are in their last year of school before the school leaving age of 15. This is the last age at which it would be possible to get a sample of an intact age group.

SCHOOLS CONCERNED

Only schools corresponding to the public schools in the United States were included as a source of subjects. In England and Scotland, denominational schools are included in the state-supported system. Since these are not state-supported schools in the United States, they were not involved in this investigation. Private schools were also excluded.

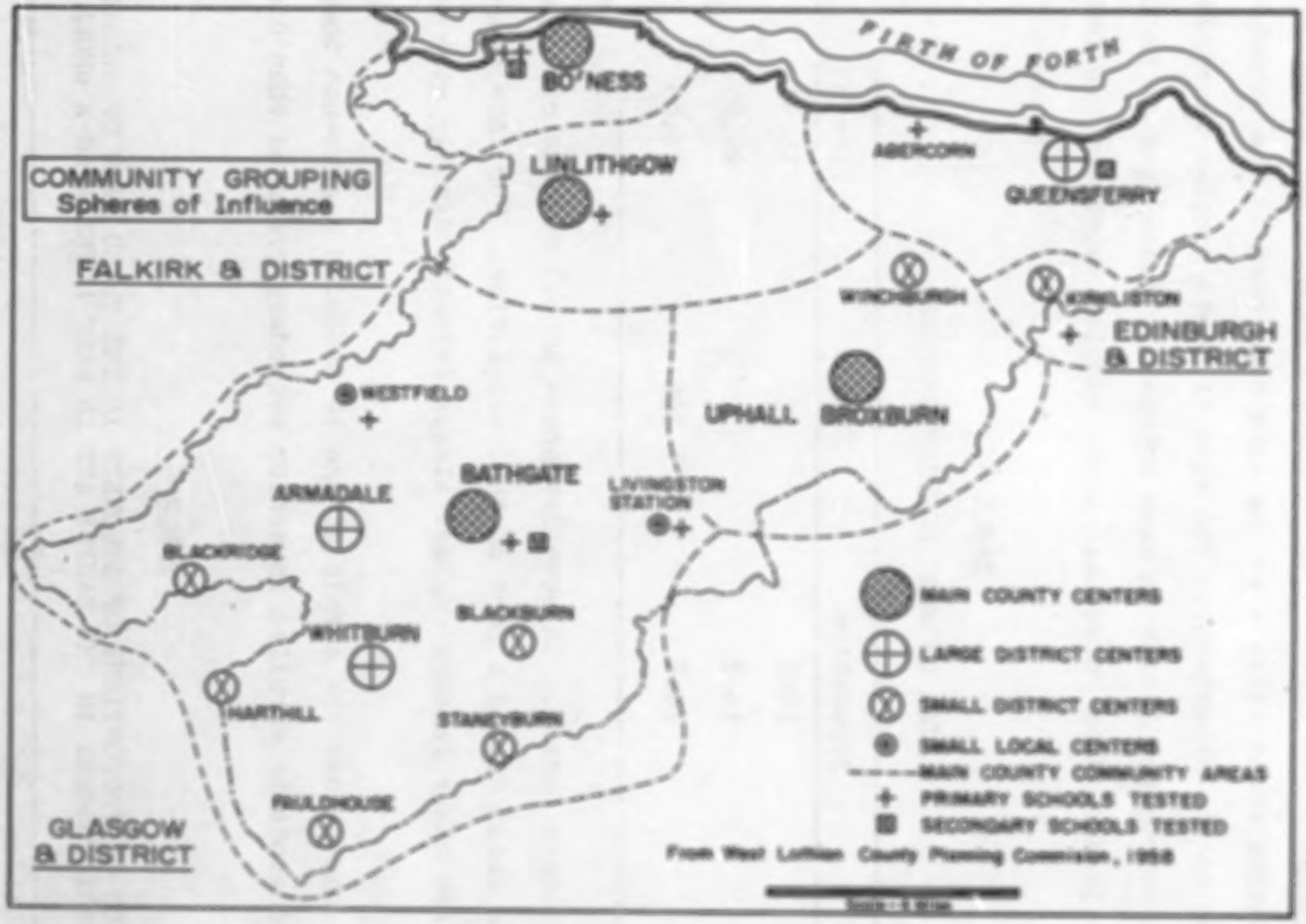
Primary schools. The primary schools included were chosen according to size and the mean IQ of the promotion class of 1961. These were the pupils who were in Primary VII the year before this investigation was undertaken and who received the Moray House Test of Verbal Reasoning as a part of their transfer examination. The choice of schools was made with the results of this test in mind to avoid a bias with respect to IQ. Size was taken into account to ensure that the proper proportion of schools of each size would be represented. The decision on the number of schools to include was made with a sample of 300-plus at each of ages 7 and 11 as a goal.

The list of schools as chosen by the investigators was then presented to the Depute Director of the West Lothian County Education Authority. In general, he concurred with the choices as representing a reasonably good sample in relation to the purposes of the project. On the list he discovered one school in which a relatively greater number of uncertificated teachers had been employed from time to time. A suitable substitution was made in that case with the recommendation of the Depute Director.

Secondary schools. The secondary schools were selected with the aid of the Depute Director. Secondary schools were chosen which represented the same areas as the primary schools included and which mixed junior and senior secondary students in the same proportion as found in West Lothian as a whole. The determination of the number of secondary schools to include was made with a sample of 300-plus at age 14 in mind.

LOCATION OF SCHOOLS

Exhibit 1 locates the participating schools on a map of West Lothian County. This map shows that the schools concerned were geographically distributed to represent most areas of the county. A few areas were excluded to avoid including an undue number of schools located in disadvantaged districts.


COMMUNITY GROUPING
Spheres of Influence
FIRTH OF FORTH
BO'NESS
LINLITHGOW
ABERCORN
QUEENSFERRY
WINCHBURGH
KIRKLISTON
EDINBURGH & DISTRICT
FALKIRK & DISTRICT
WESTFIELD
UPHALL
BROXBURN
BATHGATE
LIVINGSTON STATION
ARMADALE
BLACKRIDGE
WHITBURN
BLACKBURN
HARTHILL
STANEYBURN
FAULDHOUSE
GLASGOW & DISTRICT
MAIN COUNTY CENTERS
LARGE DISTRICT CENTERS
SMALL DISTRICT CENTERS
SMALL LOCAL CENTERS
MAIN COUNTY COMMUNITY AREAS
PRIMARY SCHOOLS TESTED
SECONDARY SCHOOLS TESTED

From West Lothian County Planning Commission, 1958

Exhibit 1. Location of schools in West Lothian testing program.

Characteristics of the Samples

SIZE OF SAMPLES

Total samples. As reported before, the West Lothian samples were obtained by testing whole classes at the ages concerned in the schools participating in the experiment. The size of these samples in relation to the total school population in West Lothian at these ages is indicated in Table 4. It should be noted that these samples represent the total number of children tested. In some instances school records were incomplete or a child missed a part of the test series. For this reason, the numbers for other factors may not always coincide exactly with these figures.

TABLE 4

SIZE OF WEST LOTHIAN SAMPLES

Age	Population	Sample	Percent
7	1612	321	19.91
11	1608	390	24.25
14	1818	339	18.65

Table 5 shows that the sample at age 14 included a somewhat lower percentage of students enrolled in senior secondary programs than did

TABLE 5

COMPARISON OF PROPORTIONS OF STUDENTS IN THE THIRD YEAR OF SENIOR SECONDARY COURSES IN THE SAMPLE AND IN WEST LOTHIAN AS A WHOLE

Population		Sample		Difference	t
No.	Percent	No.	Percent		
606/1818	33.33	96/339	28.32	5.01	1.81

the population from which it was drawn. However, the difference between the proportions is not significant. Computation was done in this case by means of a test of the difference between two proportions described by Garrett (1958, pp. 235-6).

Distribution by sex. Table 6 shows how the West Lothian samples were divided between boys and girls. The samples at ages 7 and 11 are well balanced according to sex. The sample at age 14 for reasons unknown includes 35 more girls than boys, but even this variation from an equal division is not statistically significant. Dixon and Massey (1957, p. 99) supplied the formula to test the hypothesis that the groups were dichotomous.

TABLE 6

DIVISION OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES

Age	Boys		Girls		z
	No.	Percent	No.	Percent	
7	163	50.78	158	49.22	.28
11	197	50.51	193	49.49	.20
14	152	44.84	187	55.16	1.92

MEAN AGES OF SAMPLES

Total samples. The mean ages of the West Lothian samples at the time of testing are presented in Table 7. These are the scores used later in computing the American norms for comparison of scores on the achievement tests. Throughout the tables, mean ages will be reported in months.

As Table 7 reveals, the actual ages of the samples were not 7, 11, and 14, but 7-plus, 11-plus, and 14-plus. The samples were closer to those exact ages at the beginning of the year in September than they were

TABLE 7

MEAN AGES OF WEST LOTHIAN SAMPLES

Group	No.	Mean	s
Primary III	320	91.13	3.76
Primary VII	386	139.61	4.92
Secondary III	339	175.68	3.50

in February when they were tested. For the sake of convenience, however, the samples will continue to be identified in this report as aged 7, 11, and 14.

Mean ages by sex. Table 8 compares the mean ages of the boys and girls in the West Lothian samples. At no age is the difference significant. Age, therefore, will not be a variable when the boys and girls in these samples are compared on the attainment tests. Note that the t statistic was applied in this case. Most of the comparisons of mean scores made in this study utilize data obtained from samples and therefore require the application of t (Dixon and Massey, 1957, p. 124). In most of these comparisons, the samples are large and the t distribution is virtually the same as the normal distribution, in which case the degrees of freedom will not be reported in the tables. Where samples are small, degrees of freedom will be given.

TABLE 8

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES

	Boys			Girls				
Group	No.	Mean	s	No.	Mean	s	Difference	t
Primary III	162	90.91	3.91	158	91.35	3.60	-0.44	1.05
Primary VII	193	140.05	4.39	193	139.17	5.38	0.88	1.76
Secondary III	152	175.95	3.70	187	175.46	3.32	0.49	1.26

MEAN IQ'S OF SAMPLES

Total samples. All West Lothian children are given the Moray House Test of Verbal Reasoning as a part of the transfer examination in Primary VII. Results on this test were available for the present sample at age 11. They received the test as members of the 1962 promotion class. The results became available from school records after this class completed the transfer examination in March of 1962. Results on the Moray House Test were also available for the present sample at age 14. These scores represent the performance of the children when they were in Primary VII.

Moray House IQ's represent standard scores based on a distribution with a mean of 100 and a standard deviation of 15 to permit comparisons with Stanford-Binet IQ's. Table 9 compares the mean IQ's of the samples at ages 11 and 14 on the Moray House Test with this norm. The sample means are somewhat below the norm, but the differences are not significant.

TABLE 9

MEAN IQ'S OF WEST LOTHIAN SAMPLES AT AGES 11 AND 14
IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
11	390	99.73	100	15	-0.27	.36
14	322	98.45	100	15	-1.55	1.85

A mean IQ is not shown for the sample at age 7. The reason is that a mental test is not administered to Primary III children in West Lothian. As a consequence, mental test results for this sample were not available from school records. However, county records indicate that there is little variation in the mean IQ's of primary school promotion classes from year to year. It seems safe to assume, therefore, that the mean IQ of the Primary III class in any school will not differ significantly from that of the Primary VII class in the same school.

Since all Primary VII children in West Lothian take the Moray House Test at the same time, it is possible to compare the sample means at ages 11 and 14 with the total school population means at those ages. This comparison is made in Table 10. Because the standard deviation of the population was not known in this case, the standard deviation of the sample was used to estimate the standard deviation of the population. This estimation is expressed as s and the t distribution applies (Dixon, and Massey, 1957, p. 115). A difference appears in favor of the sample at each age. These differences are significant at the 1% level. The object, however, was not primarily to obtain a sample representative of West Lothian, but to use West Lothian as a source of subjects who would perform according to the test norm of 100. It is felt that the latter objective was achieved rather well as previously revealed in Table 9.

TABLE 10

COMPARISON OF MEAN IQ'S OF WEST LOTHIAN SAMPLES WITH MEAN IQ'S OF TOTAL WEST LOTHIAN SCHOOL POPULATION AT AGES 11 AND 14

Age	Sample				Difference	t
	No.	Mean	s	μ		
11	390	99.73	11.86	96.6	3.1	5.17**
14	322	98.45	9.10	96.2	2.3	4.51**

Mean IQ's by sex. Table 11 compares the mean IQ's of the boys and girls in the West Lothian samples at ages 11 and 14 on the Moray House Test. The difference is not significant at either age. Thus, intelligence will also be under control when the comparisons are made of the boys and girls in the West Lothian samples on the achievement tests.

2

TABLE 11

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES AT AGES 11 AND 14

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
11	197	100.72	12.91	193	98.73	10.62	1.99	1.66
14	147	98.20	9.06	175	98.66	9.15	-0.46	.45

The Testing in West Lothian

The testing program included an assessment of reading comprehension, reading vocabulary, spelling, handwriting, and oral reading. The fact that oral reading requires an individual test placed a limit on the number of children who could be tested. The test of oral reading, therefore, was confined to a systematic sample of 50 children from the complete sample at age 7. Since oral reading receives its greatest stress during the early grades, it was felt that the administration of the test of oral reading to a similar sample at the later ages was not vital. For the other measurements, group tests were employed. These were applied to all of the children in the samples.

TEST INSTRUMENTS

Reading. The Paragraph Meaning and Word Meaning subtests of Form J of the Stanford Achievement Test were used to test reading comprehension and reading vocabulary. The Primary Battery was used at age 7, the Intermediate Battery at age 11, and the Advanced Battery at age 14. These instruments were standardized in 1952 over large segments of the United States and the norms adequately represent the public schools of this country, except for all-Negro segregated schools.

The Paragraph Meaning Test is composed of a series of paragraphs, scaled in difficulty, from each of which one or more words is missing. The pupil's grasp of the passage is tested by giving him a choice of four words to supply for each missing word. The score is the number of correct choices. The maximum scores possible on this test are 48 on the Primary Battery, 48 on the Intermediate Battery, and 44 on the Advanced Battery.

The Word Meaning Test offers the pupil a choice of four words to complete each of a series of sentences. A point is given for each correct choice. On this test, the maximum scores possible are 38 on the Primary Battery, 48 on the Intermediate Battery, and 46 on the Advanced Battery.

For these tests at the ages investigated, the test manuals report the reliability coefficients shown in Table 12. The tests yield reliable measurements at each age.

TABLE 12

RELIABILITY COEFFICIENTS[1] OF STANFORD PARAGRAPH
AND WORD MEANING TESTS BY AGE LEVEL

Age	No.	Paragraph Meaning	Word Meaning
7	244	.956	.912
11	248	.920	.917
14	298	.821	.894

[1] Split-half reliability coefficients corrected by the Spearman-Brown formula.

The reading tests were administered without alteration. The Stanford Achievement Test is designed for use in all English-speaking countries and the factor of cultural bias appears to be negligible. Scholl (1960) used the same tests in a similar study of groups of English children aged 7, 9, 11, and 13. Burton-upon-Trent, Staffordshire.

England, served as the source of her subjects. Half of her subjects at each age took an adapted form of the tests. The adaptations were limited to such changes in spelling as aeroplane for airplane, and to the substitution of the appropriate English word where meanings differed, such as lorry for truck. No significant differences were found between children taking the adapted form and those taking the regular form of the tests. Other investigators using American tests with British children have not made test adaptations (Anderson, 1949; MacGregor, 1934; Taylor, 1950). It was felt that using the tests in their original form would protect the standardization and permit the application of the published norms without introducing a new variable.

Spelling. For testing spelling, the spelling section of the 1947 edition of the Metropolitan Achievement Test was used. The test forms involved were Form S of the Primary II Battery at age 7, Form V of the Intermediate Battery at age 11, and Form V of the Advanced Battery at age 14. For the purpose of this investigation, a spelling test of the dictation type was necessary to allow the analyses of spelling errors contemplated. The 1947 edition of the Metropolitan Achievement Test is one of the few American achievement tests which incorporates a spelling test of this type at all ages. Most of the other achievement batteries currently on the market in the United States resort to the recognition type of spelling test, especially at the later ages. These are tests more of proofreading than of spelling as it is used in writing (Gage, 1959). This is a weakness brought about largely by the trend toward machine scoring.

The spelling test of the Primary II Battery contains 24 words. The Intermediate and Advanced Batteries each include a spelling test of 50 words. For the spelling tests, the test manuals report the reliability coefficients shown in Table 13. The test reliability is high at each level.

TABLE 13

RELIABILITY COEFFICIENTS[1] OF METROPOLITAN SPELLING TEST BY TEST LEVEL

Battery	No.	Test Reliability
Primary II	363	.936
Intermediate	350	.933
Advanced	280	.943

[1] Split-half reliability coefficients corrected by Spearman-Brown formula.

The use of an American spelling test with English and Scottish children introduces the possibility that certain words may cause difficulty because they are not as commonly used in England and Scotland as in the United States. In order to check this factor, the words of the primary and intermediate spelling tests were compared with the Birmingham list of basic words for English children (Burroughs, 1957). On the primary test, two words fall in the third 500 most frequently used words, three in the second 500, and the remainder in the first 500. On the intermediate test, 24 words do not appear on the Birmingham list, but only one of these occurs on any of the American lists consulted. This is the word vacation. The British commonly use the word holiday to express this meaning. The large number of words not found on the Birmingham list or the lists of Gates, Rinsland, or Thorndike is explained by the fact that these lists were compiled with elementary school children in mind and the more difficult words on the intermediate test go beyond that level. In many cases, the word missing is a derivative of a word found on both the English and American lists. With the exception of one or two words, then, the spelling tests may be assumed to be free of any serious cultural bias.

Handwriting. For assessing the quality of handwriting, the Metropolitan Handwriting Scale was used, partly because it is not linked to any particular commercial system of handwriting. This feature is important when comparing the handwriting of children taught by different methods.

The Metropolitan Scale provides for rating both manuscript and cursive writing. This feature was also essential, inasmuch as both styles of writing were involved in this investigation. Manuscript writing is almost universally employed at age 7. At ages 11 and 14, the style of writing found is typically cursive. Since the Metropolitan Scale was originally designed with early elementary school children in mind, an addition was made to the scale for rating cursive writing in order to extend its use to the later age groups.

The rating is done by comparing the sample of handwriting obtained from the child with the specimens making up the scale. The best match is found and a numerical rating is assigned accordingly. Consideration is given to such details as size, spacing, slant, letter formation, and alignment, as well as to the over-all appearance and legibility of the sample. Only the quality of handwriting was assessed. Speed was not measured.

Although examples of handwriting were collected from all of the children in the samples, the rating was confined to the papers of a random sample of 50 boys and 50 girls from the complete samples at each age. The samples were reduced to these numbers because of the diligence required to obtain reliable ratings of handwriting. The same limitation was exercised in connection with the rating of the handwriting of the English samples and of the groups of American children included in the investigation.

Oral reading. The oral reading test consisted of Gray's Oral Reading Paragraphs. This test is composed of 12 paragraphs, graduated in difficulty. The test continues until the child has made seven or more errors on each of two separate paragraphs. Both rate and accuracy enter into the final score. Each paragraph is timed and scored separately.

The total score consists of the sum of the scores on the individual paragraphs.

TEST ADMINISTRATION

Testing schedule. The testing took place during the period February 2 to 23, 1962. The group tests were conducted in the pupils' own classrooms during regular periods of the school day. Schedules had to be adjusted to some extent in the secondary schools to provide the necessary time for testing. The tests in the primary schools were administered in two sittings, either morning and afternoon or on succeeding days, whichever better suited the schedule of the individual school. The tests in the secondary schools were administered in one sitting with a rest period in the middle. The Paragraph and Word Meaning Tests were given during one sitting, the spelling and handwriting tests during the other. The time limit for the Paragraph Meaning Test is 25 minutes at all levels and for the Word Meaning Test, 10 minutes at the primary level and 12 minutes at both the intermediate and advanced levels. The spelling and handwriting tests required about an hour of testing time.

Testing conditions. The group tests were administered by the classroom teachers under the supervision of one of the investigators. The teachers involved were thoroughly briefed on the purposes of the investigation, the content of the tests, and the details of the test administration. They were advised to administer the reading tests according to the directions in the manual and to observe the time limits closely. The children marked their answers in the test booklets.

The reading tests included a few words, the British spelling of which varies from the American spelling, as, for example, aeroplane for airplane. The teachers were told to answer questions regarding such differences in national spelling by giving the correct British spelling. However, in no case were they to interpret words or sentences.

The words of the spelling tests were presented by the word-sentence-word method. The children wrote the words on paper provided for the purpose. The teachers were instructed to repeat words whenever requested by the pupils. Scottish accent varies enough from American speech to introduce pronunciation as a variable. For this if for no other reason, the help of the classroom teachers was enlisted in giving the tests. It was felt that the pupils' own teachers could communicate the words of the spelling tests better than an American could. The manual offers sentences for use in presenting the words, the purpose being to illuminate the meanings of the words. Some of these sentences were not suitable to the Scottish situation. Teachers were instructed, therefore, that they might use other sentences of their own invention in such cases.

The sample of handwriting was obtained by having the children copy a passage printed in primer type at the top of a sheet prepared for the purpose. The rest of the sheet was lined for the child's writing. Each child thus received an individual copy of the passage and uniformity of presentation was assured. The children were asked to copy the passage on the lines beneath in the way that they "normally write." All were told to use pencil, also for the sake of uniformity of procedure.

The 50 children who were given Gray's Oral Reading Test were chosen as a systematic sample from the class lists composing the complete sample at age 7. In effect, these lists were placed end to end and the selection was made by taking every eighth boy and every eighth girl as their names appeared on this master list. This procedure was used in order to represent each participating school in the same proportion as each contributed to the total sample, as well as to balance the sexes. The initial count yielded a sample of 43. Seven additional names were drawn at random to assure a final sample of 50. Substitutions were made for children absent on the test day by taking the next name on the list.

The oral reading tests were given in each school by one of the investigators upon completion of the group tests. These tests were conducted in a room suitable for the purpose provided by the headteacher. The tests were recorded on tape to obtain permanent records which could be scored later, eliminating the necessity for keeping time and checking errors while the child was reading. The usual precautions were taken to establish rapport with the children. Each child was allowed to hear his own voice on the recorder after finishing the test. In general, the children were highly motivated and regarded the test as something special. Motivation was likewise high throughout the group testing.

CHAPTER IV

SOURCE OF ENGLISH SAMPLES

Notice has previously been given of the intention to offer parallel accounts of the work accomplished in England and Scotland. We turn now to the English contribution. The English samples were obtained from the county borough of Leeds. This chapter describes Leeds as the source of these samples.

Leeds County Borough

GENERAL INFORMATION

For administrative purposes, England is divided into 62 counties, each governed by an elected council. Within the counties there are 83 county boroughs, cities of 75,000 or more population, which are exempted from the authority of the county and elect their own council. In addition, the city of London and 28 surrounding metropolitan boroughs are administered as a county by the London County Council. The 1944 Education Act assigned the management of the schools to the councils of the counties and of the county boroughs. These 146 local authorities are responsible for the education of children in England and Wales (Clark, 1957; Stout, 1953).

The fact that England is highly urbanized, with over half of the population residing in centers of over 50,000 population, warrants the choice of one of the county boroughs as the source of the English samples. The county borough chosen was Leeds, primarily on the basis of data reported by Emmett (1954), who had previously conducted a study of the comparative intelligence of urban and rural children in England. Although all districts were not included in Emmett's survey, the sample was sufficiently large to yield valid comparisons. The most significant aspect of the report for the present purposes is the comparison of 22 county boroughs and 15 counties where the same test was administered. The test used was the Moray House Test of Verbal Reasoning, and it was given to all 11-year-old children in these districts at some time between November, 1949, and January, 1951. This sample included about 28% of county borough and about 20% of all county 11-year-old children in England, exclusive of London and Middlesex. The results showed that the mean IQ for the county boroughs was slightly higher than the mean for rural districts, and somewhat lower than for the county urban and municipal districts. The mean IQ for all 22 county boroughs included in the comparison was 99.87. The county borough of Leeds had an identical mean. The mean IQ of all pupils in the comparison was 100.10. These results indicate that Leeds is highly representative of English intelligence. The willingness of the local school officials to cooperate settled the choice of Leeds as the source of the English samples.

Location. Leeds is a city and county borough located in the middle of West Riding, Yorkshire, in north central England. It is on the river Aire and at the edge of the narrowest part of the Pennines, about midway between the east and west coasts of England. This advantageous position makes it an important nodal town with road, rail, and canal connections to other parts of England, as well as a market and distribution center for the surrounding mining and industrial areas. Its situation in the soft water region of the Pennines encouraged development of the woolen industry as early as the 14th century, and the coal and iron mines led to metal manufacturing. This industrialization has produced a densely populated area. Today there is a population of about 4,000,000 within a 30 mile radius of Leeds (Leeds City Council, 1961).

Population. In 1961 the total population of England and Wales was 46,071,064. Cities above 50,000 accounted for over 1/2 of this total and for 2/3 of the urban population. With a population of 510,597 in 1961, Leeds is the fifth largest city in population and the third largest in area, outside London. The population of Leeds remained virtually unchanged from 1951 to 1961, whereas the population of the nation as a whole increased by 5.3% during the same period. The failure of Leeds to show a comparable rate of growth can probably be attributed to movement to the suburbs, since the birth and death rates for Leeds are practically the same as the national average (General Register Office, 1962). The percentage distribution of the population by age in Leeds is also close to the national pattern.

Social class. A substantial fraction of the population of Leeds is composed of skilled workers, owing to the nature of the chief industries. Clothing manufacturing alone, the largest single industry, accounts for about 17% of the employed population. Other important industries are engineering, vehicle manufacturing and repair, paper making and printing, metal manufacturing, and production of leather goods. Over 1/2 of the employed population of Leeds is engaged in some form of manufacturing as compared with a national average of 40%. The 1961 census classifies 57.5% of employed males in Leeds, 15 years of age and over, in the skilled occupations, which is about 5 percentage points higher than the national average. The percentage of white-collar workers and professional people in Leeds is slightly below the national average. The same applies to the percentage of the partly skilled. Unskilled occupations engage a slightly higher share of Leeds' population than of the nation's. Leeds is fairly typical of the socio-economic structure of other large industrial centers of England.

Leeds Education Authority

EDUCATION IN ENGLAND

The present educational system in England is based on provisions of the 1944 Education Act. The chief authority is the Minister of Education who is directly responsible to Parliament. He is assisted by separate advisory councils for England and Wales. The minister is accountable for the promotion of schools and education for all the people, and for execution of the provisions of the Education Act by the local education authorities (Smith, 1958). The ministry does not provide, maintain, or staff schools of any kind (British Information Services, 1958).

Types of schools. Schools in England may be classified according to the amount and type of public support which they receive. State and county schools are completely maintained and operated by the Local Education Authority. Voluntary schools, usually sponsored by religious groups, may be controlled, aided, or special agreement schools. The amount of control exercised by the Local Authority depends on the amount and type of aid given. In addition, there are independent or private schools, such as the English public schools. These may receive some public funds in exchange for a specified number of free places. Those that do receive such funds are called direct-grant schools. All schools, however, are open to inspection by the Ministry of Education and must conform to certain standards (British Information Services, 1958).

Locally, education is administered by the Local Education Authority, an administrative division of the local county council or county borough. The Local Authority is responsible for providing a full range of educational opportunity for all children within its jurisdiction. This includes primary, secondary, and further education.

Primary education includes nursery schools for children under 5, with attendance optional; infant schools for children from 5 to 7; and junior schools for children from 7 to 11. Attendance from age 5 is compulsory.

Three types of secondary education are provided: grammar schools, providing a college preparatory or academic education; technical schools, with vocational training bearing some relation to the industry and commerce of the area; and secondary modern schools, which provide a general education until the school leaving age of 15. In most communities, admission to the secondary program and assignment to type of training is determined on the basis of intelligence and attainment tests, teacher estimates, and some consideration for the desires of parents. In some areas the three-fold system of secondary education has been replaced by a comprehensive secondary school to which children are sometimes admitted without the usual 11-plus assessment.

School year. The school year consists of three terms totaling 200 days or 40 weeks. The autumn term begins the first week in September and ends shortly before Christmas. The spring term extends from the first week in January to about Easter, and the summer term April to mid-July. The normal school day is 5 1/2 hours long.

Teacher certification. Qualification for teaching in England may be achieved in different ways. A university graduate needs no additional training in order to teach. He may, however, take an additional year of work in the university education department. If successful, he receives either a certificate or diploma depending on performance in theory and practice. Successful completion of 3 years education at a training college also leads to a teaching certificate. Teachers are paid equal salaries for equal qualification and experience regardless of where they teach. An exception to this rule is made for certain cities such as London and Birmingham, where an additional cost of living allowance is granted.

EDUCATION IN LEEDS

Number of schools. The Leeds educational system is maintained and directed by a county borough authority, responsible under the 1944 Education Act for providing a full range of educational opportunity. During the 1960-1961 school year, the Authority maintained 123 primary schools and 57 secondary schools with additional free places in 5 direct-grant grammar schools for about 12.5% of the total grammar and technical school enrollment. Represented among the primary schools are some serving all ages, some with separate primary and junior departments, and some with separate departments for boys and girls. Secondary schools included 9 grammar schools, 3 technical schools, 2 comprehensive schools, and 43 secondary modern schools of which 7 were denominational schools. The Authority also maintained 7 special schools for the mentally or physically handicapped. In January 1961, there were 78,353 children enrolled in the schools maintained by the Leeds Education Authority. This accounted for about 95% of the school age population from ages 5 to 15.

Advanced educational facilities maintained by the Local Authority include: colleges of Art, of Commerce, and of Technology; branch colleges of Commerce, of Building, and of Engineering and Science; two Training Colleges; a College of Physical Education; and a College of Housecraft. During the 1960-61 session, these institutions enrolled 2,646 full-time students, 17,701 part-time students, and 6,297 in evening institutes and miscellaneous classes. In addition, Leeds University enrolls about 4,500 full-time students not under the Local Authority.

Operation of schools. Children are accepted in the infant division at the beginning of the term in which they reach the age of 5. New admissions are accepted in September, January, or April. Admission to junior school or secondary schools is in the fall only. Normally, enrollment will be in the school nearest the home. The school day is 5 hours long for infants, and 5 1/2 hours long for juniors and secondary students. A 20-

minute break is usually scheduled during the morning and afternoon sessions.

Large enrollments are reflected in class sizes. Classes in infant schools are as large as 46 pupils, though 84.6% are below 40. Junior schools have classes ranging up to 49 pupils with 77.8% below 40. Secondary classes fare somewhat better with most of them below 40 and 75% below 35. The pupil-teacher ratio for the total system in Leeds for the 1960-61 session was 26.6 to 1.

In February, 1961, there were 2,950 full-time qualified teachers in Leeds, of whom 37.5% were men. In addition, there were 216 part-time teachers and also 38 temporary teachers who spent the year gaining practical experience before entering a training college (City of Leeds Education Committee, 1961).

Transfer examination. Entrance to the secondary programs in Leeds, as in all of England, is largely on the basis of intelligence and attainment tests. Estimates of junior school headteachers are also taken into account and some consideration is given to the wishes of parents as well. This evaluation is made at approximately the age of 11. Each year a small number of late developers, after the age of 11, are given places if they show promise of being capable of more advanced academic work. In 1961, about 22% of Leeds children were offered places in the technical schools, grammar schools, or grammar divisions of the comprehensive schools. This is close to the national rate of such placement.

School leavers. School attendance in England is compulsory to the age of 15. The operation of this requirement is evident from reports of percentages of children attending school at various ages. According to the 1951 census, Leeds was close to the national average at ages 10 to 14, with 96.4% enrolled. The enrollment at ages 15 to 19 was 12.8% in Leeds compared with 14.9% in the nation as a whole. The drop-out rate in Leeds is thus somewhat higher than the national rate.

At the end of 4 years in secondary school, students sit for an examination in one or more subjects for the General Certificate of Education at the Ordinary Level. The number of passes and subjects passed usually determine the areas of specialization for grammar and technical students during the next 3 or 4 years. Grammar and technical students are expected to remain in school for 5 years or to about the age of 16. However, each year about 10% fail to complete the 5-year course (City of Leeds Education Committee, 1961).

At the age of 18, or after 7 to 8 years in secondary school, students sit for the General Certificate of Education at the Advanced Level in one or more subjects. Success on this examination admits students to a university.

Teaching of Reading, Handwriting, and Spelling in Leeds

READING

Leeds children enter infant school at the beginning of the term in which they reach the age of 5. They are enrolled in a reception class and at the end of the school year are passed to the first form of the infant school. Children entering this form, therefore, have had from one to three terms of schooling, depending on their age. All children in infant school attend for a full day.

Educators in England have given considerable attention to reading readiness. Children in the reception classes are given every opportunity to read if they wish and if they are ready for the experience. However, educational authorities urge that children should not be forced to read if they are not ready for the formal reading program (Ministry of Education, 1959). It is recognized that forcing a child to read before he is ready may be one cause of backwardness in reading.

Informal reading may begin in the reception class if a child is ready for it, but formal reading is postponed to the first form. Less mature children may not receive formal reading instruction until the second year. Teachers employ the methods recommended by educational authorities (Ministry of Education, 1959; Morris, 1958). These consist of a combination of sentence, look-and-say, and phonic methods. Leeds teachers may differ, however, in the stress placed on each method and in the point at which formal phonics is introduced.

Time tables are usually made out by each teacher, subject to the approval of the head who determines time allotment as well as method. In Leeds, the usual period for reading instruction in infant school is from an hour to 1 1/2 hours in length. In the junior division, it is from 45 minutes to an hour in length. These time allotments are consistent with those reported in a recent survey of reading practices in England (Morris, 1959).

Among the most widely employed beginning reading texts in England are the Janet and John series, Happy Venture series, and Beacon Readers. All the infant schools included in this research listed the Janet and John series for beginning reading. The others were also mentioned frequently as material for beginning reading instruction. In the junior school, children who still need formal instruction in reading use series like the Beacon Readers and the Royal Road series. Others read widely from library books and various source materials to develop their skills and experience.

About 2/3 of Leeds children referred to the Child Guidance Centre during the 1960-61 school year were in need of educational guidance. Most of these had specific reading disabilities. During the 1960-61 session, 72 remedial groups were formed in 30 junior schools for 306 pupils. Remedial teaching was provided by staff members of the Child Guidance Centre several times weekly. An additional 98 children, attending schools where remedial cases were few, received help from their own teachers assisted by special consultants. The most severe cases received individual help at the Child Guidance Centre each week (City of Leeds Education Committee, 1961).

A special remedial unit was formed during the 1960-61 session in one junior school to give daily attention to children retarded in reading and number work. It was conducted by a regular teacher under the supervision of a staff member of the Child Guidance Centre. The experiment was so successful that it was to be extended to other schools (City of Leeds Education Committee, 1961).

HANDWRITING

Children entering infant school in Leeds spend 1/2 hour daily on activities aimed at eye-hand coordination. Following these readiness activities, instruction in the formation of letters and words is given during the 1/2 hour devoted each day to composition. There seems to be little formal teaching of handwriting. No commercial models nor scales are used. Instead, the children copy from their readers and from the teacher's work on the board. While writing on the board, the teacher draws attention to the direction of strokes, spacing, size of letters, and other requirements of legible handwriting. The children copy in writing booklets. These are unlined in infant school. Ordinary pencils are used.

Manuscript or printing is used in infant school. The transition to cursive writing occurs at about age 8 when children enter junior school. The use of ink is introduced about the 2nd year of junior school. A daily period is devoted to composition in junior school, just as in infant school. Handwriting continues to be taught as a part of this period. The teacher again illustrates on the board how letters should be formed, how words should be spaced, and how strokes can connect manuscript writing. Some teachers use the Richardson style, taught in many teacher training institutions. This is a form of manuscript writing connected with short, upward strokes. A few schools have introduced italic writing. The children continue to write in their copy books, which contain lined paper in junior school. The teacher checks all written work. Errors are underlined. In general, throughout primary school, handwriting is considered a tool to be used in daily work and perfected during the composition period and through individual correction. Handwriting is not taught after primary school.

SPELLING

Spelling is taught informally from the beginning of infant school as a part of the composition period, just as is handwriting. This is a natural merger, inasmuch as spelling is normally executed through writing. In keeping with this approach, emphasis is placed on words needed and used in writing and on the correction of individual errors. Some schools provide booklets in which the children keep lists of words that have given them difficulty. These booklets are alphabetized to enable children to refer to words with ease. This informal method of teaching spelling is continued throughout primary school.

Some schools supplement the informal method with more formalized spelling lessons, beginning during the last year of infant school. About three new words are introduced each day for 4 days. On the 5th day, the children write from dictation a prose passage including the week's 12 words. Lists used for this purpose include words causing particular difficulty, words taken from reading vocabularies, or words taken from the Schonell list. This procedure is continued in junior school, where the children may receive five new words for each of 4 days. The 5th day is again reserved for a dictation exercise incorporating the words introduced during the week. At the teacher's discretion, review of words of previous weeks may be included in any dictation presented. Oral spelling is seldom used and testing on an isolated list of words is rare. Spelling rules are taught incidentally.

In general, the methods used in Leeds to teach reading, handwriting, and spelling conform to the procedures recommended by educational authorities (Ministry of Education, 1959).

Summary

The following facts describe Leeds as the source of the English samples:

1. Leeds is located in a densely populated area of England.

2. Leeds is an indsutrial town with a large fraction of skilled workers.

3. The Leeds population is predominantly working class.

4. The population of Leeds has remained fairly constant over the past ten years.

5. The percentage distribution of population by ages in Leeds is close to that of England and Wales as a whole.

6. Leeds maintains a complete educational system including facilities for further education. A university is also located in Leeds.

7. Percentages of Leeds children attending educational institutions at various ages are close to percentages for England and Wales as a whole.

8. Leeds employs the customary 11-plus assessment to stream children into secondary programs.

9. Practices in the teaching of reading, handwriting, and spelling in Leeds conform generally to those employed elsewhere in England.

10. The series of readers used in Leeds are among the most widely used series in England as a whole.

11. Leeds provides a remedial service for educationally retarded children.

12. The mean intelligence score of Leeds children is close to the national average.

CHAPTER V

PROCEDURE IN LEEDS

Selection of Samples

AGES CONCERNED

The Leeds samples, like the West Lothian samples, were obtained by testing whole classes in a number of different schools in the city. The grades concerned were Infant II, Junior IV, and Secondary III. These grades capture children at the approximate ages 7, 11, and 14. For the purposes at stake, these grades present the same advantages as the grades tested in West Lothian. The top infants have had sufficient schooling to permit reliable measurements of reading and spelling achievement and quality of handwriting. The top juniors face the 11-plus assessment which determines the course of further education. The third form of secondary school offers the last chance to obtain a sample of an intact age group before the school leaving age of 15.

SCHOOLS CONCERNED

The samples were limited to schools completely under the control of the Local Education Authority. These are known as County Schools. They correspond to the public schools of the United States. The schools included were selected with the assistance of the Senior Psychologist of the Child Guidance Centre, and of the office of the Leeds Education Authority. The objective was to obtain a sample of 300-plus at each of ages 7, 11, and 14.

Primary schools. The primary schools were chosen according to size, geographical location, and mean IQ of the Junior IV class of the year before, who had taken the Moray House Test of Verbal Reasoning as a part of the 11-plus assessment. Mental measurements were not available on the infants. The assumption was made, therefore, that the mean IQ of these juniors was representative of the entire school, inasmuch as no mental testing was attempted as a part of the project investigation. Predicating the intelligence of the infant groups on the performance of the junior groups made it necessary to select schools in which the infant department was included in the same building or in which the separate feeder schools could be identified. The first option applied in all but one case, where three feeder schools served the junior department as well as the infant division within the school. These feeder schools were visited and those pupils who would normally attend this particular junior school were tested.

The socio-economic distribution of the samples at these ages was controlled by a choice of schools representing different levels in proportion to the socio-economic distribution of the total school population in Leeds. A school was chosen to represent each of the following areas: a corporation housing area, a predominantly private housing area, and a mixed housing area. A fourth school was divided between corporation and private housing.

Secondary schools. Leeds has a number of secondary schools catering to the practical as well as to the academic needs of the children. From among these, a comprehensive school was selected in order to achieve a sampling of all levels of ability. It was found, however, that the proportion of students of higher ability in this school was lower than in the total secondary population in Leeds. Many of the more capable students are found in the grammar schools owing to their prestige and opportunity for advanced education. To avoid biasing the sample, testing was conducted in one grammar school and sufficient papers were drawn at random to secure the correct proportion of these students. Table 14 compares the percent of students in the sample who were in selective places with the percent of students offered selective places in 1959 when the sample group was promoted. The difference between the proportions is not significant.

TABLE 14

PROPORTION OF STUDENTS IN SELECTIVE PLACES IN SAMPLE AT AGE 14 COMPARED WITH PROPORTION OF STUDENTS GRANTED SUCH PLACES IN PROMOTION CLASS OF 1959

Population		Sample		Difference	t
Number	Percent	Number	Percent		
1874/8314	22.54	73/362	20.17	2.37	.48

Characteristics of the Samples

SIZE OF SAMPLES

Total samples. The number of children tested at each age in Leeds is shown in Table 15. These samples compare favorably with the West Lothian samples in actual size. However, the Leeds samples represent a much smaller fraction of the total enrollment at each age than the West Lothian samples, obviously because an age group in Leeds numbers several times as many children as in West Lothian. The Leeds samples are nevertheless adequate in size. Missing data reduce the numbers a bit in some comparisons.

TABLE 15

SIZE OF LEEDS SAMPLES

Age	Population[1]	Sample	Percent
7	6803	338	4.97
11	7118	382	5.37
14	8804	362	4.11

[1] From Annual Report, City of Leeds Education Committee, 1961.

Distribution by sex. Table 16 separates the Leeds samples into boys and girls. The samples at ages 7 and 11 include a higher proportion of girls, while the proportion of boys is higher at age 14. However, variations from an even division are not significant at any age.

TABLE 16

DIVISION OF BOYS AND GIRLS IN LEEDS SAMPLES

Age	Boys		Girls		z
	Number	Percent	Number	Percent	
7	158	46.75	180	53.25	1.19
11	185	48.43	197	51.57	.62
14	199	54.97	163	45.03	1.92

MEAN AGES OF SAMPLES

Total samples. The mean ages of the Leeds samples are reported in Table 17. The comparisons of the Leeds samples with the test norms were based on these ages. It will be noted that the mean ages of these samples are very close to the exact ages of 7, 11, and 14 by which the groups are identified. The West Lothian samples were about 7 months older on the average at each level. The practice of admitting children to reception classes at the beginning of any term during which they become 5

TABLE 17

MEAN AGES OF LEEDS SAMPLES

Group	Number	Mean	s
Infant II	338	83.39	3.87
Junior IV	381	132.05	4.14
Secondary III	362	168.78	3.90

years of age accounts for the lower mean ages of the Leeds samples. West Lothian children are admitted to the infant division in September if they reach 5 by December 1. New admissions are also accepted in West Lothian at the beginning of the third term if the children turn 5 during the interim, but the numbers admitted at this time are small. On the whole, therefore, Leeds children are likely to run somewhat younger at each stage than West Lothian children. This age difference was eliminated as a factor by basing separate studies on the Leeds and West Lothian data.

Mean ages by sex. The mean ages of the boys and girls in the Leeds samples are compared in Table 18. The girls are a bit older on the average at all ages, but differences are not significant. The comparisons of the boys and girls in the Leeds samples on the achievement tests will not be affected by age differences.

TABLE 18

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN LEEDS SAMPLES

Group	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
Infant II	158	83.10	3.90	180	83.63	3.84	-0.53	1.26
Junior IV	185	131.83	4.27	196	132.25	4.01	-0.42	1.00
Secondary III	199	168.55	3.86	163	169.05	3.94	-0.50	1.20

MEAN IQ'S OF SAMPLES

Total samples. The Moray House Test of Verbal Reasoning is given to all children in Leeds schools in the fall of the school year in which they reach the age of 11. The test given at this time precedes the test administered as a part of the regular 11-plus assessment later in the year. All children receive the preliminary test whether they elect to take the competitive examination or not. Results of the test administered in the fall were available from school records on the sample at age 11. Scores on the Moray House Test were also obtained from the same source on the sample at age 14. The scores on these children represent their performance when they were in the Junior IV class.

The mean IQ's of the Leeds samples at ages 11 and 14 are compared with the test norm in Table 19. The sample means are above the norm at both ages. The differences are not especially large, but they are statistically significant. Children with low IQ's were under-represented in these samples. The results of the comparisons on the achievement tests will have to be assessed with this fact in mind.

TABLE 19

MEAN IQ'S OF LEEDS SAMPLES AT AGES 11 AND 14
IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	Number	Mean	μ	sd		
11	370	103.51	100	15	3.51	4.50**
14	302	105.99	100	15	5.99	6.97**

Mental tests are not administered to infant classes in Leeds. IQ's, therefore, were not available from school records on the sample at age 7. However, these children were identified with schools in which the mean IQ of the Junior IV class was known. It is not unlikely that the mean

IQ of the top infants would be close to the same.

Mean IQ's by sex. Table 20 compares the mean IQ's of the boys and girls in the Leeds samples at ages 11 and 14. At age 11, a significant advantage appears in favor of the girls. Comparisons of the boys and girls in this sample on the achievement tests will entail further consideration of this difference. The girls also hold a small advantage at age 14, but this difference is not significant.

TABLE 20

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS
IN LEEDS SAMPLES AT AGES 11 AND 14

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
11	177	101.76	15.12	193	105.02	15.63	-3.26	2.04*
14	167	105.49	13.02	135	106.62	12.09	-1.13	.78

The Testing in Leeds

The testing in Leeds was conducted during the period March 8 to 29, 1962, following the completion of the testing in West Lothian the month before. The group tests were administered with the assistance of a team of examiners from the Office of the Senior Educational Psychologist, Child Guidance Centre, Leeds. Otherwise, the same procedures applied as in West Lothian. The same investigator administered the oral reading test as in West Lothian. This test in both instances was limited to a systematic sample of 50 children from the complete sample at age 7. All of the children in the samples received the group tests.

CHAPTER VI

SOURCES OF COMPARABLE DATA ON AMERICAN CHILDREN

In order to carry out the objectives of this investigation, it was necessary to obtain results on the same tests given the West Lothian and Leeds samples on similar groups of American children. These data were gathered from Jackson, Michigan, and Pinellas County, Florida. The data obtained from these sources were needed in connection with the study of variances, the comparisons of boys and girls, and the comparisons of spelling errors. Advantage was also taken of the opportunity to compare the mean scores of the West Lothian and Leeds samples and the American samples on the tests used, in order to supplement the comparisons which were made between the mean scores of the West Lothian and Leeds samples and the test norms. The quality of handwriting of the West Lothian and Leeds samples and American children could not have been compared at all without these additional data, since the Metropolitan Handwriting Scale does not furnish norms which lend themselves to this purpose.

Pinellas County served as the source of scores on the Stanford Paragraph and Word Meaning Tests. Results on the Metropolitan Spelling Test, the Metropolitan Handwriting Scale, and Gray's Oral Reading Test were obtained from Jackson. The decision to use Pinellas County as a source of the Stanford scores stemmed from a discovery that these scores were already available in Pinellas, where the same test forms as administered in West Lothian and Leeds had been used in the county's own testing program in the past. In Jackson, the tests were administered _de novo_. A more detailed account of the conditions under which the Jackson and Pinellas data were collected follows, with attention directed first to Jackson.

Jackson as a Source of Data

GENERAL INFORMATION

In Michigan there are 16 cities with a population between 50,000 and 250,000 and one city with a population above one million. All are located in the bottom half of the Lower Peninsula. In 1960 these 17 urban centers included 39.8% of the total population of Michigan. At the same time, 31.9% of the total population of the United States resided in 310 urban centers with populations above 50,000. Thus, Michigan is somewhat more urbanized than the country as a whole. Jackson is one of the 17 urban centers of Michigan.

Location. Jackson is located 73 miles west of Detroit on the western fringe of Southeastern Michigan, the most densely populated and highly industrialized part of Michigan. Jackson is the county seat and largest city in Jackson County, one of six counties forming a second tier of counties north of the Ohio border. According to one account, the Republican Party was founded "under the oaks in Jackson" in 1854. A state prison is also located in Jackson. No connection! There are evil doers in both political parties, although it may take the other party to find them.

Population. Michigan had a population of 7,823,194 in 1960, representing 4.4% of the total population of the United States. The population of Jackson in 1960 was 50,720, or less than 1% of the Michigan total. Jackson's population decreased by .7% from 1950 to 1960 compared with an increase of 22.8% for Michigan and 18.5% for the country as a whole. The slight decrease in population for Jackson may reflect the general trend in the United States for residents to move to the suburbs, outside city limits.

In addition, Jackson had a slightly lower birth rate than the state as a whole. The U. S. Census Bureau uses a fertility ratio to obtain a rough index of the natural growth tendencies in population. This ratio is the number of children under 5 years of age per 1,000 female population, 15 to 49 years of age. In 1960 the fertility ratio for Jackson was 520 compared with 534 for Michigan and 488 for the United States in general.

In 1960, Jackson had a slightly lower percentage of foreign-born (4.1%) than Michigan (6.8%) or the United States (5.4%). In the same year the percentage of non-white population in Jackson was 9.3% as compared with 9.4% for Michigan and 11.4% for the United States. The U. S. Census Bureau estimates that 19 out of 20 non-whites are negro.

Jackson's population is relatively stable as defined in terms of percentages of native and migrant inhabitants. Native population includes those who in 1960 were living in the state of their birth. Defined as such, 70.9% of Jackson's population was classified as native population as compared with 72.1% for Michigan and 70.3% for the United States. Migrant population includes those 5 years of age and older who lived in a different county in 1955, either within the state or outside the state. As so defined, 12.6% of Jackson's population was classified as migrant as compared with 14.4% for Michigan and 17.4% for the United States.

Social class. Classifying people into social classes is not without its difficulties, but some indication of social class may be inferred from a study of occupation, income, and educational level attained by the adult population. In 1960, 31.1% of the male population of Jackson was engaged in some form of manufacturing, compared with 38.0% for Michigan and 19.5% for the United States. The major industries of Jackson include manufacture of automobile and airplane accessories, stone and clay products, metal fabrication, machinery, and bakery goods. The comparatively high percentage of men in Michigan employed in manufacturing reflects the industrialized nature of the state as a whole.

In 1960, white collar occupations engaged 43.9% of Jackson males and 40.1% of Michigan's and 34.8% of the nation's males. The median income of families in Jackson in 1959 ($6,422) was somewhat higher than that for Michigan ($6,256) or for the nation as a whole ($5,660).

The middle class character of Jackson is further reflected in the educational level of the population. In 1960, 10.7% of Jackson males, 25 years of age or over, had completed 16 or more years of schooling as compared with 8.4% for Michigan and 9.7% for the United States. Moreover, 43% of the adult population had completed high school compared with about 41% for Michigan and the United States.

JACKSON SCHOOL SYSTEM

Composition of schools. According to state law, children must attend school between the ages of 6 and 16 unless they are physically and mentally unable to do so. School districts may provide kindergartens for children 5 years of age, but attendance is not compulsory. Nursery schools for children under the age of 5 are not considered a part of the public school system.

During the 1961-62 school year, the Jackson school system included one junior college, one senior high school, three junior high schools, and 22 elementary schools. There were approximately 7,700 elementary pupils, 5,100 secondary enrollees, and 1,200 junior college students. In addition, approximately 4,500 children, or about 25% of the total school age population, attended non-public schools, maintained primarily by religious groups. Children from these church related schools were not included in this investigation.

School year. In Michigan, local school boards determine the length of the school term which by law may not be less than 9 months. A school month is defined as 4 weeks of 5 days each, or 180 days for 9 months. In some districts, the school year exceeds this minimum. The average length of the school year in the United States as a whole is 177.6 days (National Education Association, 1962). The school day is typically 5 1/2 hours long.

In Jackson, children are assigned to school according to the geographical location of their homes. Children are admitted to kindergarten in September if they reach the age of 5 by December 1. Kindergarten children attend school for half days or about 2 1/2 hours. Beginning with the 1st grade, children attend for full days or about 5 hours. The school day is lengthened to 5 1/2 hours by the beginning of the 5th grade. The length of the school year in Jackson is roughly 36 weeks.

Teacher certification. To be qualified, teachers in Michigan must possess a valid teaching certificate issued by the State Board of Education. Certificates are granted to graduates of an accredited college or university who have completed 20 semester hours of professional education course work including methods and directed teaching. Local school boards may employ uncertified teachers on an emergency basis. During 1961-62, 8.9% of Michigan's and 6.3% of the nation's teachers were uncertificated, according to estimates of the National Education Association (1962). During 1962-63, only 3.18% of Jackson's teachers were uncertificated.

Pupil-teacher ratio. The pupil-teacher ratio in the fall of 1961 was 26.1 to 1 in Michigan and 25.6 to 1 in the United States, according to another estimate of the National Education Association (1962). The pupil-teacher ratio in Jackson at the same time was 25.3 to 1.

Testing program. Jackson maintains a comprehensive program of testing pupils enrolled in its schools. Group tests of intelligence are administered each year to students enrolled in kindergarten and in grades 2, 4, 6, 7, and 12. Individual tests of intelligence are administered to students who present special problems. Tests of reading achievement are administered annually in grades 1 through 6 and English achievement tests in grades 7 through 12. Tests of arithmetic achievement are given each year in grades 1 through 9. In addition, tests of musical aptitude, vocational interests, personality, achievement in specialized secondary school subjects, and college aptitude are administered during the secondary school years. Test results are readily available to teachers and counselors for the guidance and counseling of students.

In general, Jackson children compare favorably with the national norms on the mental and achievement tests administered as a part of the annual testing program. Certainly there is no reason to believe that Jackson children achieve less well than children in similar communities around the country.

School drop-outs. Children in Michigan must attend school to the age of 16. This requirement provides a point of reference for assessing the holding power of schools when attendance is no longer demanded by law. According to the 1960 census, 78.4% of the population at ages 16 and 17 remained enrolled in school in Jackson compared with a Michigan average of 84.7% and a national average of 80.9%. These statistics indicate that the Jackson schools hold a slightly lower proportion of students after the permissable leaving age of 16 than do the schools of Michigan or of the United States as a whole.

TEACHING OF READING, HANDWRITING, AND SPELLING

Jackson teachers plan their weekly schedules around a weekly time block suggested by the Division of Instruction. Approximately 2/3 of the school day is devoted to language activities in the 1st and 2nd grades. Language arts activities constitute somewhat less than half of the school day in the later elementary grades. The Division of Instruction also issues guides for teachers with suggested activities, methods, and materials for teaching reading, handwriting, and spelling. These guides are prepared and revised frequently by committees of teachers. Generally speaking, methods of teaching reading, handwriting, and spelling in Jackson conform to the current trend in the United States.

Reading. In Jackson, the kindergarten year is devoted primarily to readiness activities, although older and more mature children may be introduced to reading if they are ready for it. In general, however, children are introduced to reading shortly after they enter the 1st grade at about the age of 6 or slightly above. The first words are commonly taught as sight words by the whole-word or look-and-say method. These sight words are then used to call attention to phonetic similarities. Listening activities designed to promote the recognition of phonetic similarities are introduced at the pre-reading or reading readiness level. From the beginning, comprehension skills are stressed to enable the child to determine new words from context.

Reading in the 2nd grade continues the work begun in the 1st grade with increasing emphasis on the development of word attack skills through phonetic and structural analysis and the use of context and picture clues. The use of the dictionary is introduced in the 2nd grade. Throughout the syllabus, reading for meaning is emphasized. Oral reading is used more as an aid to interpretation to help the child experience what he has read than as a check on silent reading and vocabulary.

During the early grades, a period is devoted to reading each morning and afternoon. For basic instruction, children are grouped within the class according to reading level. The most commonly employed sets of standard readers are the Ginn and Company, Houghton-Mifflin, and Scott-Foresman series. In addition, the Allyn and Bacon and the Winston series are recommended as supplementary materials.

Remedial reading instruction is available to children who are lacking in basic skills. Special teachers circulate among the elementary schools and work with small groups of children several times a week. During the 1961-62 school year, there were six full-time and one part-time reading improvement teachers. In addition to working directly with children, these teachers serve as consultants to classroom teachers on problems of remedial instruction.

Handwriting. Jackson children are also introduced to handwriting shortly after they enter the 1st grade. A period a day is devoted to handwriting, once the instruction begins. The manuscript style is employed at the start. The change to cursive writing occurs late in the 2nd grade or early in the 3rd grade. Daily practice periods are continued through the 6th grade. Handwriting instruction is confined less to a separate period after the 6th grade, although a period a week may continue to be employed in the 7th and 8th grades for further improvement of handwriting skill. Students are encouraged to develop techniques which will enable them to use this time for evaluating their own handwriting by using standardized scales with which to compare their work and measure their own progress. The Zaner-Bloser program serves as a general basis for handwriting instruction.

Spelling. Spelling is introduced on an informal basis during the last half of the 1st grade. First-grade children learn to spell primarily by copying words which the teacher supplies for them when they are engaged in other language activities. In the 1st grade particularly, learning to spell is closely coordinated with reading and handwriting activities. Beginning with the 2nd grade, a daily period is devoted to spelling and more formal procedures are introduced. However, the children do not receive a speller until the 3rd grade, although 2nd grade teachers base their lessons on a speller without giving it to the pupils. The basic spelling series used is Spelling for Word Mastery, published by Charles Merrill Books, Inc. In addition, teachers use the Dolch list of 220 service words and the Fitzgerald list of 350 most useful words as supplementary sources of spelling words. Throughout the year, emphasis is on thorough teaching and developing effective study techniques rather than on testing.

The procedures for the 3rd through 9th grades are in general a continuation of those begun in the 2nd grade. The basic series is followed and supplementary word lists are used. Emphasis is again on the procedure of learning to spell unfamiliar words and individualized instruction. Each child keeps lists of words he most frequently misspells. In addition, individual and small group games and spelling aids, and practice in learning to use the dictionary, are provided according to the needs and developmental level of the pupils.

JACKSON (WL) SAMPLES

It has been reported before that the West Lothian samples were about 7 months older on the average than the Leeds samples. This age difference was overcome by pairing different groups of Jackson (and Pinellas) children with the West Lothian and Leeds samples. This section is addressed to the groups of Jackson children who were used in the comparisons with the West Lothian samples.

Size of samples. Both sets of Jackson samples were obtained by testing whole classes at the grade levels concerned in a variety of schools in the city. This was similar to the procedure used in West Lothian and Leeds. For the comparisons with the West Lothian samples, the grades

TABLE 21

SIZE OF JACKSON SAMPLES

Grade	Population[1]	Sample	Percent
2	1034	406	39.26
6	923	402	43.55
9	992	418	42.14

[1] Membership as of fourth Friday following Labor Day, 1961-62.

included were 2, 6, and 9. These grades represent approximately the same age groups as were tested in West Lothian. Table 21 reports the size of the samples in relation to the total enrollment in the grades involved. The samples represent a substantial fraction of these figures on total enrollment.

Distribution by sex. Table 22 distributes the samples according to sex. At no age is the variation from an even division significant, although it approaches significance at age 7, where for some unknown reason the girls outnumber the boys by 44 cases. If anything, this excess of girls will introduce a bias in favor of the sample, since girls are likely to excel boys in reading, handwriting, and spelling during the early grades.

TABLE 22

DIVISION OF BOYS AND GIRLS IN JACKSON SAMPLES

Age	Boys		Girls		z
	No.	Percent	No.	Percent	
7	181	44.58	225	55.42	2.19
11	197	49.00	205	51.00	0.40
14	201	48.09	217	51.91	0.78

Mean ages of total samples. Table 23 compares the mean ages of the Jackson and West Lothian samples. The Jackson samples are older in each case. Differences are significant at the 1% level. However, they are a matter of only about three months at most. One reason why the Jackson samples are older is that they include repeaters, while the West Lothian samples do not. Children in England and Scotland rarely repeat a year (Wall, et al., 1962). Another reason why the mean ages differ is the

TABLE 23

COMPARISON OF MEAN AGES OF JACKSON AND WEST LOTHIAN SAMPLES

Group	Jackson			West Lothian			Difference	t
	No.	Mean	s	No.	Mean	s		
Primary	406	94.17	4.28	320	91.13	3.76	3.04	10.13**
Intermediate	402	142.32	5.07	386	139.61	4.92	2.71	7.53**
Secondary	418	178.51	4.43	339	175.68	3.50	2.83	9.76**

West Lothian practice of admitting children at the beginning of the third term. The numbers admitted at this time are small, but they nevertheless serve to depress the mean age.

The mean ages of the Jackson samples could be reduced by eliminating the repeaters but not without also removing many of the slow learners. The net effect would be to create a bias in favor of the Jackson samples, since slow learners were not removed from the West Lothian samples. For this reason, repeaters were not excluded from the Jackson samples.

Mean ages by sex. The mean ages of the boys and girls in the Jackson samples are compared in Table 24. The boys are older in grades 2 and 6, but only the difference in grade 6 is significant. This age dif-

TABLE 24

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN JACKSON SAMPLES

Grade	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
2	181	94.52	4.46	225	93.88	4.12	0.64	1.49
6	197	142.90	5.65	205	141.76	4.38	1.14	2.24*
9	201	178.43	4.55	217	178.58	4.33	-0.15	.34

ference can probably be attributed to retention policies. On the whole, Jackson children are promoted in age groups. However, a small fraction are retained each year, chiefly in the lower grades. Since boys are more apt to be retained than girls, the mean age of the boys in each grade naturally tends to be higher. The effect is most evident in the 6th grade, probably because of the accumulation at this age of children retained during the first 6 years of school. The balance at the 9th grade level is likely the result of grouping policies in the junior high school.

Mean IQ's of total samples. Table 25 compares the mean IQ's of the Jackson samples at ages 7 and 11 with the American norm on the Lorge-Thorndike Group Intelligence Test. This test is given to Jackson children at these ages as a part of the school system's own testing program and scores were furnished from school records. The sample means are significantly above the norm at both ages. This was not by design, since the original intention was to obtain samples with mean IQ's much closer to the norm. What happened to defeat this objective is not clear. The schools chosen for the purpose were supposed to yield samples with the mean IQ's desired, if you could judge by records on file in the Office of Pupil Services. However, sometimes the best laid plans go awry. Fortunately, it did not matter much. This will become clear when the results are reported.

TABLE 25

MEAN IQ'S OF JACKSON SAMPLES AT AGES 7 AND 11 IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
7	406	105.82	100	16	5.82	7.37**
11	390	109.40	100	16	9.40	11.60**

IQ's were not available for the sample at age 14. However, these children had received the Differential Aptitude Tests while in the 8th grade, and the results of this test were available from school records. The Verbal Reasoning and Numerical Ability subtests yield a score which serves the same purpose as an IQ. Norms are provided in terms of raw scores and are reported separately for boys and girls. Table 26 indicates that the sample at age 14 was normal in intelligence.

TABLE 26

COMPARISON OF JACKSON BOYS AND GIRLS AT AGE 14
WITH THE NORMS ON THE COMBINED TESTS OF
VERBAL REASONING AND NUMERICAL ABILITY

Group	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
Boys	183	35.7	35.0	14.2	0.7	.67
Girls	204	33.3	32.1	13.5	1.2	1.26

Mean IQ's by sex. Tables 27 and 28 show that there were no significant differences between the mean mental test scores of the boys and girls in the Jackson samples.

TABLE 27

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS
IN JACKSON SAMPLES AT AGES 7 AND 11

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	181	105.18	12.02	225	106.33	12.13	-1.15	.96
11	192	108.62	14.11	198	110.12	12.30	-1.50	1.12

TABLE 28

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 14 ON COMBINED TESTS OF VERBAL REASONING AND NUMERICAL ABILITY

Boys			Girls			Difference	t
No.	Mean	s	No.	Mean	s		
183	35.7	14.2	204	33.3	13.5	2.4	1.70

JACKSON (WL) TESTING

Group tests. The Metropolitan Spelling Test and Handwriting Scale were administered to the Jackson samples early in 1962 during the same period of the year as the testing in West Lothian. The tests were given by assistants employed through the Office of Pupil Services. This testing was conducted in the pupils' own classrooms during regular periods of the school day. The same instructions were applied as in West Lothian. Only one sitting was required, since the group testing in Jackson did not include the Stanford Paragraph and Word Meaning Tests. The testing time was about an hour.

Oral reading test. Gray's Oral Reading Test was administered in Jackson as in West Lothian to a sample of 50 children at age 7. This sample was drawn from a variety of schools representing the city, precisely in the same fashion as in West Lothian, except that these children were not chosen from the Jackson sample at age 7 who participated in the group tests, but were included as a separate group a year later. They were tested with Gray's paragraphs in February, 1963, at about the same age as the West Lothian sample. The same investigator administered the test as in West Lothian and the same procedures were used, including the recordings on tape.

Table 29 compares the mean ages of the Jackson and West Lothian samples participating in the test of oral reading. The Jackson sample is

TABLE 29

COMPARISON OF MEAN AGES OF JACKSON AND WEST LOTHIAN SAMPLES SELECTED FOR TEST OF ORAL READING

Jackson			West Lothian			Difference	df	t
No.	Mean	s	No.	Mean	s			
50	92.18	3.75	48	90.94	3.31	1.24	94	1.75

slightly older on the average, but the difference is not significant. The degrees of freedom in this comparison were computed by a formula applied to small samples (Dixon and Massey, 1957, p. 124). The same formula was used to compute degrees of freedom in all other comparisons of small samples requiring the determination of the significance of t.

The mean IQ of this Jackson sample of 50 children is compared with the test norm in Table 30. A significant difference does not occur.

TABLE 30

COMPARISON OF MEAN IQ OF JACKSON SAMPLE USED IN STUDY OF ORAL READING WITH NORM ON LORGE-THORNDIKE GROUP INTELLIGENCE TEST

Sample		Norm		Difference	z
No.	Mean	μ	sd		
50	102.85	100	16	2.85	1.26

Tables 31 and 32 compare the mean ages and IQ's of the boys and girls in the same group of Jackson children. These factors were obviously under satisfactory control in relation to the projected comparison of the boys and girls in this sample on Gray's Oral Reading Test.

TABLE 31

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN JACKSON SAMPLE USED IN STUDY OF ORAL READING

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
26	91.85	3.72	24	92.54	3.81	-.69	49	.64

TABLE 32

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS IN JACKSON SAMPLE USED IN STUDY OF ORAL READING ON LORGE-THORNDIKE GROUP INTELLIGENCE TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
26	102.85	11.93	24	101.79	12.12	1.06	49	.31

JACKSON (L) SAMPLES

This section turns to a description of the groups of Jackson children who were used in the comparisons with the Leeds samples. These Jackson samples were obtained from grades 1, 5, and 8. The switch was made to these grades in order to accommodate the difference between the ages of the Leeds and West Lothian samples.

Size of samples. The size of the samples obtained is reported in Table 33. These samples are not as large as the Jackson counterparts of

TABLE 33

SIZE OF JACKSON SAMPLES

Grade	Population[1]	Sample	Percent
1	1133	302	26.65
5	1005	304	30.25
8	874	304	34.78

[1] Enrollment as of the fourth Friday in September,1962-63.

the West Lothian samples, but they still represent an adequate fraction of the enrollment in the grades involved.

Distribution by sex. The samples are distributed according to sex in Table 34. The variation from an even division is not significant at any age.

TABLE 34

DIVISION OF BOYS AND GIRLS IN JACKSON SAMPLES

Age	Boys		Girls		z
	No.	Percent	No.	Percent	
7	150	49.67	152	50.33	.080
11	150	49.34	154	50.66	.161
14	142	46.71	162	53.29	.783

Mean ages of total samples. Table 35 compares the mean ages of the Leeds samples and their Jackson counterparts. The Jackson samples hold the advantage in each case. The differences are small, but statistically significant at the first two levels. It is doubtful, however, that any of these differences will seriously affect the comparisons on the achievement tests. It is just that statistical tools become very sharp when

TABLE 35

COMPARISON OF MEAN AGES OF JACKSON
AND LEEDS SAMPLES

Group	Jackson			Leeds			Difference	t
	No.	Mean	s	No.	Mean	s		
Primary	302	84.17	4.32	338	83.39	3.87	.78	2.39*
Intermediate	303	133.44	6.16	381	132.05	4.14	1.39	3.36**
Secondary	302	169.40	5.68	362	168.78	3.90	.62	1.61

samples reach the present size.

Mean ages by sex. The mean ages of the boys and girls in this set of Jackson samples are compared in Table 36. The boys are older on the average in all grades. The differences are significant in grades 5 and 8, but not in grade 1. These findings are related to the fact that boys are more likely to include repeaters than girls. Since repeaters were not excluded from these samples for reasons indicated before, the mean ages of the boys naturally tend to run higher. Fortunately, the smallest difference occurs in grade 1, where an age difference would be a more serious factor than in the later grades.

TABLE 36

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN JACKSON SAMPLES

Grade	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
1	150	84.31	4.64	152	84.03	3.99	.28	.562
5	149	134.67	6.67	154	132.25	5.38	2.42	2.47^{**}
8	142	170.57	6.06	160	168.36	5.12	2.21	3.40^{**}

Mean IQ's of total samples. Table 37 compares the mean IQ's of the present Jackson samples at ages 7 and 11 with the American norm on the

TABLE 37

MEAN IQ'S OF JACKSON SAMPLES AT AGES 7 AND 11 IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
7	288	97.83	100	16	-2.17	2.30^{*}
11	290	103.54	100	16	3.54	3.77^{**}

Lorge-Thorndike Group Intelligence Test. This test is not given in the 1st and 5th grades in Jackson, but it is administered in the kindergarten and 4th grades. The results in the table, therefore, are based on the performance of the children when they were in school the year before. The test used with kindergarten children is of the non-verbal type. Missing data reduce the numbers somewhat from previous comparisons. The table shows that the sample mean was below the norm at age 7, while it was above the norm at age 11. The differences are small, but statistically significant. Incidentally, the mean IQ of the Leeds sample at age 11 was 103.51 on the Moray House Test. A happy coincidence!

In the 8th grade, Jackson children receive the Differential Aptitude Tests in lieu of an IQ test. The combined score on the Verbal Reasoning and Numerical Ability subtests takes the place of an IQ. Table 38 compares the sample at age 14 with the norms on these subtests. The table is broken down according to sex because separate norms are reported for boys and girls. The sample means are slightly above the norms, but the differences are not significant. The Leeds sample at this age was significantly above the norm on the Moray House Test.

TABLE 38

COMPARISON OF JACKSON BOYS AND GIRLS AT AGE 14 WITH THE NORMS ON THE COMBINED TESTS OF VERBAL REASONING AND NUMERICAL ABILITY

Group	Sample		Norm		Difference	t
	No.	Mean	μ	sd		
Boys	141	29.91	29.4	13.4	.51	.45
Girls	161	30.44	28.7	12.6	1.74	1.71

Mean IQ's by sex. Tables 39 and 40 compare the boys and girls on the mental tests. A significant difference occurs only at age 11, where the girls hold the advantage. The results at this age duplicate the outcome

TABLE 39

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS
IN JACKSON SAMPLES AT AGES 7 AND 11

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	141	96.74	14.46	147	98.87	13.07	-2.13	1.31
11	144	101.31	15.05	146	105.75	13.52	-4.44	2.64**

of the same comparison of the boys and girls in the Leeds sample on the Moray House Test. Another act of fate!

TABLE 40

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS IN JACKSON
SAMPLE AT AGE 14 ON COMBINED TESTS OF VERBAL
REASONING AND NUMERICAL ABILITY

Boys			Girls			Difference	t
No.	Mean	s	No.	Mean	s		
141	29.91	13.30	161	30.44	12.44	-.53	.36

JACKSON (L) TESTING

Group tests. The Metropolitan Spelling Test and Handwriting Scale were administered to the Jackson counterparts of the Leeds samples in May, 1963. A bit of mental arithmetic indicated that by this month of the school year Jackson children in grades 1, 5, and 8 would be of about the same age as the Leeds samples already tested. The testing in Jackson was scheduled accordingly. All other conditions paralleled those under which Jackson counterparts of the West Lothian samples were obtained. Since this ground has already been covered, it will not be repeated here.

Oral reading test. This section describes the group of Jackson children who were compared with the Leeds sample at age 7 on the test of oral reading. These were 1st grade children drawn as a systematic sample from the same schools that supplied the subjects for the group tests at this level. This testing was also conducted in May, 1963, by the same investigator who had administered all previous tests of oral reading. The tests were recorded on tape, just as before. A final sample of 49 children was obtained.

Table 41 compares the mean ages of the Jackson and Leeds samples used in the study of oral reading. The Leeds pupils are about a month older on the average, but the difference is not significant.

TABLE 41

COMPARISON OF MEAN AGES OF JACKSON AND LEEDS SAMPLES SELECTED FOR TEST OF ORAL READING

Jackson			Leeds			Difference	df	t
No.	Mean	s	No.	Mean	s			
49	83.18	3.53	47	84.19	3.35	-1.01	95	1.44

Table 42, 43, and 44 complete the description of this special sample of Jackson children. No significant differences arise to disturb the comparisons to be made on the oral reading test. IQ's were again unearthed from kindergarten records. Missing data reduce the number on this attribute.

TABLE 42

COMPARISON OF MEAN IQ OF JACKSON SAMPLE USED IN STUDY OF ORAL READING WITH NORM ON LORGE-THORNDIKE GROUP INTELLIGENCE TEST

Sample		Norm		Difference	z
No.	Mean	μ	sd		
41	101.02	100	16	1.02	.41

TABLE 43

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN JACKSON SAMPLE USED IN STUDY OF ORAL READING

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
26	83.35	3.15	23	83.00	3.72	.35	46	.36

TABLE 44

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS IN JACKSON SAMPLE USED IN STUDY OF ORAL READING ON LORGE-THORNDIKE GROUP INTELLIGENCE TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
21	101.24	14.02	20	100.80	11.36	.44	40	.11

Pinellas County as a Source of Data

GENERAL INFORMATION

Pinellas County is one of 67 counties in Florida. Large areas of the state consist of uninhabitable lowlands so the population has tended to settle in a few urban centers. According to the 1960 census, there are 10 cities in Florida with populations of 50,000 or more, the largest being Miami with a population of 291,000. Seven metropolitan areas account for 65.5% of the total population of the state. One of these is the Tampa-St. Petersburg area. St. Petersburg is in Pinellas County, but Tampa is not.

Location. Lying near the center of the western coast of Florida, Pinellas County forms a peninsula between Tampa Bay and the Gulf of Mexico. It is in the most densely populated area on the Gulf coast, one of the chief resort areas of the state. St. Petersburg, the largest city in the county, located near the southern tip of the peninsula, is the center of an urbanized area which includes 86.7% of the county population. The only other sizeable city in the county is Clearwater, the county seat. Pinellas and neighboring Hillsborough County together contain 15.6% of the population of Florida.

Population. Though it is next to the smallest county, Pinellas, with a land area of 168,960 acres, had a population of 374,665 in 1960. This was over 7.5% of the population of Florida in an area which is less than 0.5% of the total land area of the state. Non-whites compose 8.9% of the population of Pinellas County, only half the average for the state (17.9%), and less than the national average as well (11.4%).

From 1950 to 1960 the population of Pinellas County increased by 135%, nearly twice the rate of growth for the state and seven times the rate of increase for the nation. Natural growth rate accounted for only a small fraction of this increase as the fertility ratio was only 409 compared with 482 for Florida and 488 for the United States. Most of the increase was due to influx of residents from other states. The 1960 census shows that only 21.1% of the inhabitants of the county were native to the state compared with 38.1% for Florida and 70.3% for the United States. Other states have obviously contributed heavily to the population of the county. The county also had about 3% more foreign-born than the average for the state and nation.

The migrant population yields another indication of population change. Migrants include all those who lived in different counties in 1960 than in 1955. Such residents composed 41.7% of the county population. The number in the same category was 32.9% for the state and 17.4% for the nation. Pinellas County has grown rapidly in number of inhabitants, most of whom have come from other states and from other counties within the state.

Social class. Commercially, Pinellas County is important for the production of livestock and poultry, and the raising of citrus fruits and nuts. Chief manufacturing industries include food processing, printing and publishing, stone, clay, and glass production, concrete and plaster, metal fabrication, and machinery manufacturing. However, the county surpasses Florida and the United States notably in the percentage of sales and service workers, while it has proportionately fewer people engaged in manufacturing and agriculture.

The 1960 census supports this appraisal of the community. Only 14.1% of the working population were engaged in manufacturing and agriculture, compared with 19.5% for Florida and 33.7% for the United States. The retail trades employed 21.6% of the working population. The number similarly employed was 17.9% for the state and 14.8% for the nation.

The 1960 census further reports that 48.1% of the employed in Pinellas County were engaged in white-collar occupations. The same occupations employed 42.5% of the state's working population and 41.1% of the nation's workers. On the whole, Pinellas County enjoys a favorable socio-economic structure, although in 1960 the median income ($4,359) was lower than that for the state ($4,722) and for the nation ($5,660). However, allowance must be made for the large number of older people residing in the county. This area is very attractive to senior citizens as a place to retire. The appeal of Pinellas County in this connection is reflected by the 1960 census which reports that 24.9% of the residents of the county were 65 years of age or older. The state and nation respectively included 11.2% and 9.2% in this category. It is possible that many of the older residents of Pinellas County work part-time, serving thus to depress the median income reported. These retired or semi-retired residents may also contribute to the rather high proportion of service workers in the county.

Another indication of the composition of the population of Pinellas County may be gleaned from statistics on the educational level of its adult residents. According to the 1960 census, 7.8% of the adult population of Pinellas County, 25 years of age or older, had completed 4 years or more of college. This was identical to the Florida average, while the average for the United States was 7.7%. Not much difference. The percentage who had graduated from high school was somewhat higher for the county (36.1%) than for the state (34.8%) and for the nation (33.4%). A related factor is the holding power of the Pinellas County schools after the age of 16 when attendance is no longer required by law. The 1960 census shows that the enrollment in the Pinellas County schools included 80.5% of the juvenile population aged 16 and 17. The Florida average was 79.4%, while the average for the United States was 80.9%. The Pinellas County schools hold their share of students, which helps to account for the proportion of high school graduates in the adult population.

PINELLAS SCHOOL SYSTEM

Composition of schools. The Pinellas schools are administered by the County Superintendent of Schools who is appointed by the County Board of Education, an elected body of citizens. The Florida School Code, as most state school laws, is more permissive than directive, allowing the counties much local autonomy. The state, however, does require attendance of all children beginning in September of each year if they are 7 years of age, or will be 7 years of age, by the following February 1. Attendance is compulsory until the 16th birthday.

The county operates schools at the elementary, junior high, senior high, and junior college levels. Additional facilities include those for special education and adult education. These may be either separate schools or combined in one building. Organization of nearly all of the day schools is on the 6-3-3 plan.

In 1958 there were 86 schools in the system. Enrollment in grades 1 through 12 in September 1957, the school year from which the samples were drawn, was 40,979. Junior college enrollment at that time was 925 and special education included 287 pupils. Adult and vocational programs enrolled 5,627 students. The Pinellas system can be considered a modern, comprehensive system, providing education for all needs from 1st grade through junior college.

School year. The Florida state laws specify that a school year shall consist of at least 196 days of duty for teachers and a minimum of 180 days of pupil attendance. Florida pupils attended school for an average of 180.1 days during the school year 1955-56. The national average that year was 178 days. Length of the school day in Florida is determined by the superintendent's office. In Pinellas County, the school day is approximately 5 1/2 hours long.

Kindergarten classes were discontinued in Pinellas County in 1955 due to lack of classroom space, a condition still prevalent as a result of the rapid increase in population. Pupils are admitted to 1st grade in September of each year provided they will be 6 years of age on or before the following January 1. Parents rarely take advantage of the opportunity of delaying entrance of their children beyond this age as allowed by the state school laws.

Teacher certification. All teachers in Florida are required to have a certificate appropriate to the positions occupied. A bachelor's degree is the minimum educational prerequisite for every member of the professional staff. In addition to 45 semester hours of general preparation, the regulations specify 20 hours of professional preparation, including 6 hours of observation and student teaching. The latter requirement may be waived for those who have had 3 years of teaching experience.

Pinellas County maintains the state standards in employment of teachers. An estimation of the quality of the staff may be gathered from the amount of training of new employees in September, 1958. Of the 450 teachers new to the system at that time, none had less than a bachelor's degree, while 152 of them possessed master's degrees, and 6 had achieved doctor's degrees. Only 24% of these newly employed teachers were in-experienced (Christian, 1959).

Pupil-teacher ratio. During the 1957-58 school year, the pupil-teacher ratio in Pinellas County was 24.3 to 1. The ratio of pupils per teacher for the whole state of Florida during the same period was 24.6 to 1. Average daily attendance per instructional position was used to compute these ratios. The ratio of actual enrollment per instructional position would be somewhat higher, since not all pupils enrolled attend every day.

Special services. Pinellas County provides a number of special services for students and staff. These include psychological services and individual testing, measurement and evaluation, research, guidance, and remedial reading. In 1957, these special services were organized into the Educational Services Division under one director. The county-wide testing program, which includes annual assessment of capacity and achievement, is under the management of the Measurement and Evaluation Center, a department of the Educational Services Division. This unit provides all related services, such as test scoring, item analysis, and summary reporting. The 1957-58 testing program, which provided the samples for this study, was carried out under the direction of this department.

TEACHING OF READING, HANDWRITING, AND SPELLING

In 1957, direction for teaching the language arts in Pinellas County Schools was provided by several bulletins from the Florida Department of Public Instruction and by a locally conceived and formulated guide. The convictions, experience, and skill of the individual principal was an important factor in translating the program into action. Two hours a day were recommended for teaching the language arts in the elementary schools. This was regarded as a block of time devoted to the language arts in general. This time allotment was more commonly possible in the primary grades than at the intermediate level.

Although the Pinellas samples were not involved in the comparisons of handwriting and spelling, a description will nevertheless be given not only of methods of teaching reading but also of methods of teaching handwriting and spelling, inasmuch as these language skills are related.

Reading. To begin with, children entering the 1st grade of Pinellas County Schools in 1957 were offered a strong reading readiness program, since less than a third of the pupils had had any kindergarten experience at all. The children were later introduced to formal reading by the whole-word or look-and-say method. A small number of basic sight words were taught as wholes to enable the children to begin meaningful reading at once. Phonetic elements were then gradually introduced as the situation warranted. Reading for meaning continued to be stressed as the child learned a variety of methods of word attack. The overall concern was to develop a permanent interest in reading as well as a mastery of basic reading skills.

Heterogeneous class grouping with intra-class grouping for skill subjusts was the usual operating procedure. Children with similar needs and abilities as revealed by tests and teacher observation were grouped togather for reading instruction. It became the duty of the teacher at each grade level to assess the reading skills already acquired by her pupils, to teach these skills as they pertained to more advanced material, and to introduce the new skills applicable.

The usual procedure in the primary grades was to devote an hour a day to formal reading during which the teacher typically handled three groups divided according to reading ability. The most commonly used readers were the Row-Peterson series. The Winston readers were also popular. Other series which received some use were the Ginn and Company and Scott-Foresman programs, although at the time these had not been in use as long as the other series mentioned.

The time devoted to reading instruction, as such, gradually decreased during the intermediate grades under the weight of the content subjects. Less time was also given to oral reading after the 1st grade, until the use made of oral reading became chiefly diagnostic by the end of the intermediate grades. Beginning with the 7th grade, a period a day was devoted to the study of English.

Handwriting. In 1957, Pinellas County children were introduced to manuscript writing in the 1st grade. The transition to cursive writing usually occurred at the beginning of the 3rd grade, although no child was compelled to make the change, unless he was ready for it. Some daily practice continued through most of the elementary grades, with the New Laurel Handwriting materials serving as a guide for instruction. Learning situations requiring the use of handwriting as a tool were utilized whenever possible and legibility was emphasized over uniformity. No period was devoted to handwriting as such in junior high, although legible handwriting was considered necessary in all subjects. A diagnostic approach was used at all levels of instruction.

Spelling. The teaching of spelling in Pinellas County in 1957 recognized the interdependence of the language arts. After letter formations were mastered, spelling became a part of all writing activities. Spelling was also introduced informally in relation to reading. Formal spelling with a textbook began in the 2nd grade and continued through the 6th grade. Weekly plans were provided by Spelling Goals, a state-adopted series published by the Webster Publishing Company. Alphabetizing was taught beginning with the 2nd grade. The use of the dictionary was encouraged in all grades, but special emphasis was placed on the dictionary skills in the 4th grade. No spelling text was used in junior high, but a suggested word list was available and used in English classes.

The present program. The language arts program of Pinellas County Schools has naturally been modified and strengthened in numerous ways since 1957. The changes and innovations include:

1. The appointment of seven curriculum consultants.

2. The formation and efficient operation of a curriculum council.

3. Studies in the area of the language arts have been conducted.

4. Library holdings have tripled.

5. Trained librarians have been provided all elementary schools.

6. The basal reader is now regarded as one part of a 5-part reading program.

7. Teachers are encouraged to provide a more individualized program for the upper third of their students when they can prove mastery of the basic skills.

8. The reading readiness program has been more definitively explained so that listening skills are given added emphasis.

9. Reading skills such as study and reference skills are carefully taught.

10. Reading in the content areas is receiving more attention than ever before.

11. A corrective and remedial program has been established to provide aid for those children not reading up to capacity.

12. Additions to the psychological staff and school casework staff offer more help to the child whose emotional problems are preventing maximal learning.

13. Provisions for continuing in-service training for principals and teachers have broadened the understanding of the staff as a whole of the varying facets of a well-balanced language arts program.

14. Guidance services to the junior high school have been provided.

The above list is reported to avoid any impression that the language arts program in Pinellas County remains the same as it was in 1957. It also serves to call attention to what might have been some of the limitations of the program in 1957.

PINELLAS (WL) SAMPLES

The several batteries of Form J of the Stanford Achievement Test were included in the testing program of 1957-58. This testing was conducted in February, 1958. The same pupils had received the Pintner General Ability Test in November, 1957. This test yields deviation IQ's based on a distribution with a mean of 100 and a standard deviation of 15. Classroom teachers assisted with the testing following a program of in-service training.

The Pinellas samples used in the comparisons with West Lothian children were obtained from the results of the testing in grades 2, 6, and 9. All pertinent information had been recorded on computer cards, alphabetically arranged into decks according to grade. The cards had been alphabetized without regard to the schools attended by the children. Each deck, therefore, represented an alphabetical file of children from a conglomeration of schools. The samples drawn from these decks were matched with the West Lothian samples case by case according to sex and by age to the month, but naturally without regard to scores on the Stanford Paragraph and Word Meaning subtests. Although the matching criteria did not include IQ, the cases were drawn from the same general distribution of IQ as the West Lothian samples. The cards were scoured from A to Z to find the right cases.

Size of samples. Table 45 compares the size of the samples with the number of children in the pools from which they came. These pools exclude negro pupils, who comprise 13% of the total enrollment in these grades. Negro pupils were also excluded from the samples. These samples represent a smaller fraction of the total enrollment in each age group than the West Lothian samples, but only because there were about twice as many children to draw from in Pinellas as in West Lothian. The Pinellas and West Lothian samples were actually identical in number, age, and sex. The matching procedure saw to that. The Pinellas samples were obviously

TABLE 45

SIZE OF PINELLAS SAMPLES

Grade	Population[1]	Sample	Percent
2	3673	318	8.66
6	3636	383	10.53
9	3144	339	10.78

[1] White students in these grades in November, 1957

matched only with West Lothian children for whom the Stanford subtest scores were available. Missing data reduced these samples slightly from the original samples described for West Lothian, but the division by sex, the mean ages of the samples, and the mean ages by sex remain essentially the same as in the case of the original West Lothian samples. An additional description with respect to these matters, therefore, is unnecessary. However, information on the IQ's of the Pinellas samples will be reported, since the matching criteria did not specifically include this attribute.

Mean IQ's of total samples. The mean IQ's of the Pinellas samples on the Pintner General Ability Test are compared with the test norm in Table 46. The sample means are satisfactorily close to the norm at all

TABLE 46

MEAN IQ'S OF PINELLAS SAMPLES IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
7	318	100.80	100	15	.80	.951
11	383	101.02	100	15	1.02	1.352
14	339	100.64	100	15	.64	.785

ages. One advantage of selecting cases from records which already exist is the control that you can exercise over factors such as this.

Mean IQ's by sex. Table 47 compares the mean IQ's of the boys and girls in the Pinellas samples. No significant differences occur. It is clear that intelligence will not be a serious variable when the boys and girls in these samples are compared on the achievement tests.

TABLE 47

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS IN PINELLAS SAMPLES

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	161	100.40	10.77	157	101.21	11.42	-0.81	.630
11	193	100.68	11.08	190	101.37	11.16	-0.69	.605
14	152	100.37	11.02	187	100.86	12.47	-0.49	.384

PINELLAS (L) SAMPLES

Samples of identical composition to those of Leeds were obtained at ages 11 and 14 by using grades 5 and 8 as the sources of the Pinellas subjects. However, it was possible only partially to match the Leeds sample at age 7, since the Stanford Achievement Test was not given in the 1st grade in the 1957-58 testing program. At this level, therefore, the 2nd grade records had to be used to obtain a sample of Pinellas children to compare with Leeds children on the paragraph and word meaning tests, which meant matching the younger cases from these records with the older top infants in Leeds. After all possible matching had been completed, the samples were reduced to 138 pairs, 63 pairs of boys and 75 pairs of girls.

Size of samples. A comparison of these Pinellas samples with the populations from which they were drawn is shown in Table 48. This table reflects the reduction in the size of the sample at age 7, but it is believed that the advantage of having a sample at this age of the same composition as the Leeds sample outweighs the disadvantage of the smaller number. Note that pupils from negro schools are again excluded. Pupils from these schools compose 14.1% of the total enrollment in these particular grades.

TABLE 48

SIZE OF PINELLAS SAMPLES

Grade	Population[1]	Sample	Percent
2	673	138	3.76
5	427	382	8.93
8	3305	362	10.95

[1] White students in these grades in November, 1957.

Distribution by sex. Table 49 shows that the distribution of the boys and girls in the Pinellas primary sample does not vary significantly from an even division. The distribution of the boys and girls in the matched sample of Leeds infants is perforce the same. The distribution by sex at ages 11 and 14 remains what it was for the original Leeds samples, since these samples were matched completely from Pinellas records. A significant variation from an even division at these older ages did not

TABLE 49

DIVISION OF BOYS AND GIRLS IN PINELLAS PRIMARY SAMPLE

Boys		Girls		z
No.	Percent	No.	Percent	
63	45.65	75	54.35	1.03

occur.

Mean ages of samples. Table 50 reports the mean age of the Pinellas primary sample, which equally describes the mean age of the matched sample of Leeds infants. The mean age jumps about 4 months, since matches could not be found for the younger subjects in the original sample of Leeds infants. The matching procedure produced samples at the other levels with mean ages identical to those of the original Leeds samples.

TABLE 50

MEAN AGE OF PINELLAS PRIMARY SAMPLE

No.	Mean	s
138	87.13	2.25

Mean ages by sex. Table 51 compares the mean ages of the boys and girls in the Pinellas primary sample. The mean ages of the boys and girls in the matched sample of Leeds infants follow suit. The girls are slightly older, but the difference is not significant. The mean ages by sex at the other levels conform to those of the boys and girls in the original Leeds samples. Significant differences did not occur, although the girls were slightly older in those comparisons as well.

TABLE 51

COMPARISON OF MEAN AGES OF BOYS AND GIRLS IN PINELLAS PRIMARY SAMPLE

Boys			Girls			Difference	t
No.	Mean	s	No.	Mean	s		
63	86.87	2.62	75	87.35	1.84	-0.48	1.21

Mean IQ's of total samples. Table 52 compares the mean IQ's of the

TABLE 52

MEAN IQ'S OF PINELLAS SAMPLES IN RELATION TO TEST NORM

Age	Sample		Norm		Difference	z
	No.	Mean	μ	sd		
7	138	101.80	100	15	1.80	1.40
11	382	102.48	100	15	2.48	3.28**
14	362	104.93	100	15	4.93	6.26**

Pinellas samples on the Pintner General Ability Test with the test norm. The sample means are above the norm at all ages. The differences are significant at ages 11 and 14, but not at age 7. The mean IQ's of the Leeds samples at age 11 and 14 were also significantly above the norm on the Moray House Test to about the same degree. A comparison is not possible at age 7, where mental test results were not available on Leeds children.

Mean IQ's by sex. The mean IQ's of the boys and girls in the Pinellas samples are compared with the test norm in Table 53. No significant differences occur. The comparison of the mean IQ's of the boys and girls in the Leeds samples disclosed a significant difference in favor of the

TABLE 53

COMPARISON OF MEAN IQ'S OF BOYS AND GIRLS IN PINELLAS SAMPLES

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	63	102.40	11.52	75	101.29	10.95	1.11	.509
11	185	101.74	12.24	197	103.19	11.34	-1.45	1.19
14	199	104.43	13.61	163	105.53	12.63	-1.10	.793

girls at age 11. A difference in the same direction occurs in the present comparison at this age, without being significant. On the whole, the mean IQ's of the Pinellas and Leeds samples integrate very well both by sex and by total sample.

This completes the description of the samples used in the investigation. The next chapter reports the results which were obtained on the achievement tests.

CHAPTER VII

RESULTS

The analysis of the results included a comparison of the mean scores of the West Lothian and Leeds samples with the American norms on the tests administered, except in the case of the Metropolitan Handwriting Scale, which does not furnish norms as such. The analysis concerning the quality of handwriting, therefore, was made by comparing the mean ratings of the West Lothian and Leeds samples with the Jackson samples on the Metropolitan Handwriting Scale. The mean scores of the West Lothian and Leeds samples were also compared with the mean scores of groups of Jackson children on the Metropolitan Spelling Test and on Gray's Oral Reading Test and with the mean scores of groups of Pinellas children on the Stanford Paragraph and Word Meaning Tests, but these comparisons were made in addition to those between the mean scores of the West Lothian and Leeds samples and the American norms on these tests.

The comparisons made with the norms were conducted in two ways. The sample means were first compared with the scores that "normal" groups of American children of the same age would be expected to achieve on the tests. These scores were derived from the tables of norms furnished with the tests. This is to say that the mean age of each sample was treated as the achievement age of a "normal" group of American children and the norm was derived by working backward from a table of age equivalents to find the raw score corresponding to that achievement age. This procedure required interpolation to obtain a norm precisely adjusted to the mean age.

The sample means were next compared with the scores that "normal" groups of American children one year above the mean age of the samples would be expected to reach on the tests. The same procedure as before was used to obtain the norm, except that 12 months were added to the mean age of the samples. A comparison on this basis tends to equalize years of instruction, but at the same time gives American children as represented by the norms the benefit of an extra year of maturity. It is felt that such a comparison may shed additional light on the relationship between developmental and instructional factors in learning to read and spell.

Finally, the mean scores of the Jackson samples were compared with the norms at the same ages as the samples on the Metropolitan Spelling Test and Gray's Oral Reading Test and those of the Pinellas samples were compared with the norms for American children of the same ages on the Stanford Paragraph and Word Meaning Tests. These comparisons were included to permit an evaluation of the quality of the American samples with which the West Lothian and Leeds samples were compared on the same tests.

This chapter maintains the distinction which has already been made between the English and Scottish components of this investigation. The results of the comparisons with the West Lothian samples will be reported first *in toto*. A parallel account will then be given of the results of the comparisons with the Leeds samples. A distillation will be attempted in the final summary and discussion of results.

Part 1

Comparison of Mean Scores of West Lothian Samples with Test Norms and with Mean Scores of Groups of American Children

PARAGRAPH MEANING

Comparison of West Lothian samples with the test norms at the same ages as the samples. Table 54 compares the mean scores of the West Lothian samples on the Stanford Paragraph Meaning Test with the norms for

TABLE 54

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS
ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	318	28.20	18.63	10.7	9.57	15.95**
11	383	32.80	31.31	8.6	1.49	3.39**
14	339	30.15	31.23	7.0	-1.08	2.84**

American children of the same age. The sample means are significantly above the norms at ages 7 and 11, but significantly below the norm at age 14. Of special interest is the age trend revealed by these results. The large difference in favor of the sample at age 7 was not maintained at ages 11 and 14. The differences at these ages, while statistically significant, are very small. Neither would appear to be significant from an educational point of view. It is possible that the difference at age 7 is educationally significant, although the point remains somewhat moot in view of the age trend revealed.

Comparison of West Lothian samples with the test norms at 12 months above the mean ages of the samples. The mean scores of the West Lothian samples on the Stanford Paragraph Meaning Test are compared with the American norms at 12 months above the mean ages of the samples in Table 55. This comparison places the sample means significantly below the norms

TABLE 55

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS
ON STANFORD PARAGRAPH MEANING TEST AT 12 MONTHS
ABOVE THE MEAN AGES OF THE SAMPLES

Age	No.	Mean	Norm	sd	Difference	z
7	318	28.20	32.57	9.8	-4.37	7.95**
11	383	32.80	35.10	7.2	-2.30	6.22**
14	339	30.15	32.99	6.7	-2.84	7.89**

at all ages. The largest change in the relationship between the sample means and the norms occurs at age 7. Growth in achievement is very rapid at this stage and it may be expected that the comparisons at 12 months above the ages of the samples will have their greatest impact on the results at age 7 on other tests as well.

Comparison of Pinellas and West Lothian samples. Table 56 presents a comparison of the mean scores of the Pinellas and West Lothian samples on the Stanford Paragraph Meaning Test. The pattern of these results is similar to that found between the mean scores of the West Lothian samples and the American norms on this test, with the West Lothian samples holding a significant advantage at ages 7 and 11, but losing that advantage at age 14, where a significant difference appears in favor of the Pinellas sample. The trend of these results is apparent at age 11, where the difference in favor of the West Lothian sample is reduced to little more than a single test point.

TABLE 56

COMPARISON OF PINELLAS AND WEST LOTHIAN SAMPLES
ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Pinellas		West Lothian		Difference	t
		Mean	s	Mean	s		
7	318	21.07	9.72	28.20	10.61	-7.13	8.84**
11	383	31.70	7.14	32.80	7.47	-1.10	2.08*
14	339	33.44	5.44	30.15	7.05	3.29	6.94**

Comparison of Pinellas samples with test norms. The mean scores of the Pinellas samples are compared with the test norms on the Stanford Paragraph Meaning Test in Table 57. The sample means are above the norms at all ages. Differences are significant at ages 7 and 14. The mean scores of the West Lothian samples on this test were significantly above

TABLE 57

COMPARISON OF PINELLAS SAMPLES WITH AMERICAN NORMS ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	318	21.07	18.63	10.7	2.44	4.07**
11	383	31.70	31.31	8.6	.39	.89
14	339	33.44	31.23	7.0	2.21	5.82**

both the test norms and the mean scores of the Pinellas samples at ages 7 and 11, while at age 14 the mean score of the Pinellas sample was significantly above both the test norm and the mean score of the West Lothian sample.

WORD MEANING

Comparison of West Lothian samples with the test norms at the same ages as the samples. Table 58 compares the mean scores of the West Lothian samples on the Stanford Word Meaning Test with the American norms at the same ages. The sample means are significantly above the norms at all ages.

TABLE 58

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS ON STANFORD WORD MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	318	25.24	16.13	8.2	9.11	19.80**
11	383	37.63	33.41	9.7	4.22	8.44**
14	339	33.36	30.42	8.5	2.94	6.39**

On the Stanford Paragraph Meaning Test, the sample mean at age 14 fell below the American norm. This reversal did not occur on the Stanford Word Meaning Test. However, there is a reduction in point spread with advance in age. To this extent the same trend is observed on both tests.

Comparison of West Lothian samples with the test norms at 12 months above the mean ages of the samples. The comparison of the mean scores of the West Lothian samples on the Stanford Word Meaning Test with the American norms at 12 months above the mean ages of the samples is presented in Table 59. In this comparison, the sample means fall below the norms at all ages, but at no age is the difference significant. On the whole, the samples maintain considerable strength on this test, even though losing the large advantage at age 7 based on the comparisons at the same ages as the samples. The change in this respect was again most pronounced at this age, just as on the Stanford Paragraph Meaning Test.

TABLE 59

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS ON STANFORD WORD MEANING TEST AT 12 MONTHS ABOVE THE MEAN AGES OF THE SAMPLES

Age	No.	Mean	Norm	sd	Difference	z
7	318	25.24	25.57	8.3	-.33	.70
11	383	37.63	38.31	8.5	-.68	1.58
14	339	33.36	34.11	8.0	-.75	1.74

Comparison of Pinellas and West Lothian samples. The comparison of the mean scores of the Pinellas and West Lothian samples on the Stanford Word Meaning Test is reported in Table 60. The West Lothian samples maintain a significant advantage at ages 7 and 11. The complexion changes at age 14, where the Pinellas sample gains the advantage. However, the difference in favor of the Pinellas sample at this age is not significant. The comparison of the mean scores of the West Lothian samples with the American norms on this test yielded a significant difference in favor of the samples at all ages, although a similar age trend was revealed.

TABLE 60

COMPARISON OF PINELLAS AND WEST LOTHIAN SAMPLES
ON STANFORD WORD MEANING TEST

Age	No.	Pinellas		West Lothian		Difference	t
		Mean	s	Mean	s		
7	318	18.15	7.95	25.24	8.52	-7.09	10.86**
11	383	32.90	7.90	37.63	7.18	-4.73	8.68**
14	339	34.40	7.06	33.36	7.59	1.04	1.85

Comparison of Pinellas samples with test norms. Table 61 compares the mean scores of the Pinellas samples with the American norms on the Stanford Word Meaning Test. The sample means are significantly above the norms at ages 7 and 14. The mean scores of the West Lothian samples on this test were significantly above the norm at all ages and significantly above the mean scores of the Pinellas samples at ages 7 and 11. At age 14, the results place the mean score of the Pinellas sample above both the norm and the mean score of the West Lothian sample. However, the difference is significant only in relation to the norm.

TABLE 61

COMPARISON OF PINELLAS SAMPLES WITH AMERICAN NORMS
ON STANFORD WORD MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	318	18.15	16.13	8.2	2.02	4.39**
11	383	32.90	33.41	9.7	-0.51	1.02
14	339	34.40	30.42	8.5	3.98	8.65**

SPELLING

Comparison of West Lothian samples with the test norms at the same ages as the samples. Table 62 shows how the mean scores of the West

TABLE 62

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS ON METROPOLITAN SPELLING TEST

Age	No.	Mean	s	Norm	Difference	t
7	313	19.67	4.82	7.13	12.54	46.44**
11	380	41.51	7.93	27.61	13.90	33.90**
14	338	35.43	9.53	29.84	5.59	10.75**

Lothian samples on the Metropolitan Spelling Test compare with the American norms at the same ages. The sample means are significantly above the norms at all ages. Evidence of an age trend is limited to the reduction in point spread at age 14.

Comparison of West Lothian samples with the test norms at 12 months above the mean ages of the samples. The comparison of the mean scores of the West Lothian samples on the Metropolitan Spelling Test with the American norms at 12 months above the mean ages of the samples is made in Table 63. The sample means remain above the norms at all ages. The differences at ages 7 and 11 are again significant, but at age 14 the difference is no longer significant. The largest change in the difference continues to occur at age 7, just as in previous comparisons made on this basis. The loss at age 14 may be the result of extrapolation beyond the

TABLE 63

COMPARISON OF WEST LOTHIAN SAMPLES WITH AMERICAN NORMS ON METROPOLITAN SPELLING TEST AT 12 MONTHS ABOVE THE MEAN AGES OF THE SAMPLES

Age	No.	Mean	s	Norm	Difference	t
7	313	19.67	4.82	16.13	3.54	13.11**
11	380	41.51	7.93	34.31	7.20	17.56**
14	338	35.43	9.53	34.56	0.87	1.67

reasonable limits of the test and/or it may reflect an age trend. Moreover, formal instruction in spelling in American schools commonly extends a year or two beyond the practice in Scottish schools. Thus, the American child at this age would have the benefit of an additional year of maturity and possibly of an additional year of formal instruction.

Comparison of Jackson and West Lothian samples. The large differences in favor of the West Lothian samples on the Metropolitan Spelling Test pose a question regarding the adequacy of the test norms. As reported before, the spelling tests were taken from the 1947 edition of the Metropolitan Achievement Test, because it is one of the few sources which offers a standardized spelling test of the dictation type at all ages. The fact remains that the norms are quite old and it may be that they no longer adequately represent the performance of American children. This is one reason why the Jackson samples were included in the investigation. They permit a direct comparison with the West Lothian samples on the Metropolitan Spelling Test. These results are reported in Table 64. The mean scores of the West Lothian samples are significantly above those of the Jackson samples at all ages. The differences in favor of the West Lothian samples remain large at ages 11 and 14, while the West Lothian sample at age 7 holds a smaller advantage. These differences occur

TABLE 64

COMPARISON OF JACKSON AND WEST LOTHIAN SAMPLES
ON METROPOLITAN SPELLING TEST

Age	Jackson			West Lothian			Difference	t
	No.	Mean	s	No.	Mean	s		
7	406	17.00	4.80	313	19.67	4.82	- 2.67	7.42**
11	402	29.83	10.60	380	41.51	7.93	-11.68	17.43**
14	418	28.95	12.16	338	35.43	9.53	- 6.48	8.20**

despite the age difference in favor of the Jackson samples and the above average IQ's of the latter groups at ages 7 and 11.

Comparison of Jackson samples with test norms. At ages 11 and 14, the West Lothian samples exceed the Jackson samples by about as much as they excel the American norms on this test. These results suggest that the tests norms remain reasonably adequate at these ages. Table 65 offers additional evidence on this point. This table compares the Jackson samples with the American norms on the Metropolitan Spelling Test. The sample mean at age 11 is slightly above the norm, but the difference is not significant. At age 14, the sample mean falls below the norm. This difference is statistically significant, but nevertheless small. At neither of these ages is there a large variation from the norm in terms of test points. The largest variation occurs at age 7, where the test norm appears to rate both the Jackson and West Lothian samples inordinately high. At this age, therefore, the comparison between the West Lothian and Jackson samples probably represents a better indication of the spelling achievement of West Lothian children in relation to American children than the comparison between the West Lothian samples and the test norms.

TABLE 65

COMPARISON OF JACKSON SAMPLES WITH AMERICAN NORMS ON METROPOLITAN SPELLING TEST

Age	No.	Mean	s	Norm	Difference	t
7	406	17.00	4.80	9.09	7.91	32.96**
11	402	29.83	10.60	29.16	0.67	1.26
14	418	28.95	12.16	31.26	-2.31	3.92**

HANDWRITING

Comparison of Jackson and West Lothian samples. The analysis of quality of handwriting was limited to a random sample of 50 boys and 50 girls from the complete samples at each age in each country. This limitation was exercised in order to reduce the burden which the rating of the handwriting of the complete samples would have imposed. Table 66 shows that the results obtained from the analysis of handwriting conform to the trend previously established on other tests. The West Lothian samples exceed the mean ratings of the Jackson samples at ages 7 and 11, but lose the advantage at age 14. Of special interest is the decrease in the mean rating of the West Lothian samples from age 11 to 14. The mean rating of the Jackson samples increases slightly between these ages. These findings may reflect a difference in the amount of attention given to handwriting in the later grades. The handwriting program in Jackson reaches into secondary school, while in West Lothian it does not. Exhibits 2 and 3 illustrate the differences between the mean ratings at ages 7 and 11, where significant differences were found in favor of the West Lothian samples.

TABLE 66

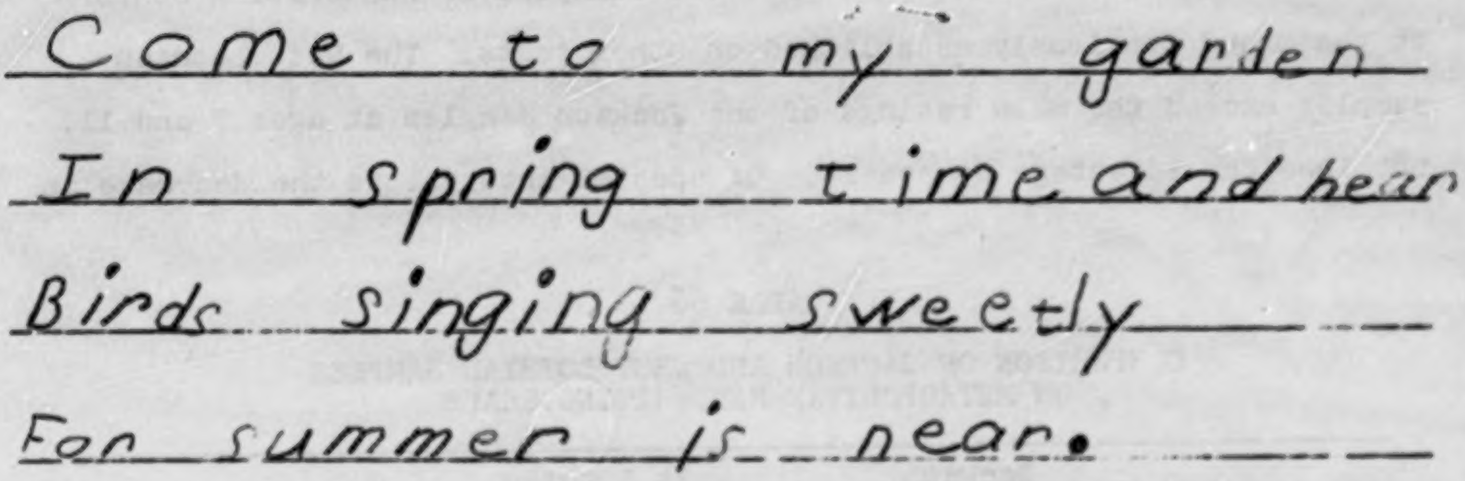
COMPARISON OF JACKSON AND WEST LOTHIAN SAMPLES
ON METROPOLITAN HANDWRITING SCALE

Age	No.	Jackson		West Lothian		Difference	t
		Mean	s	Mean	s		
7	100	52.20	8.14	56.45	7.12	-4.25	3.93**
11	100	54.40	5.65	59.00	5.12	-4.60	6.03**
14	100	55.60	7.73	55.80	5.11	-0.20	0.22

ORAL READING

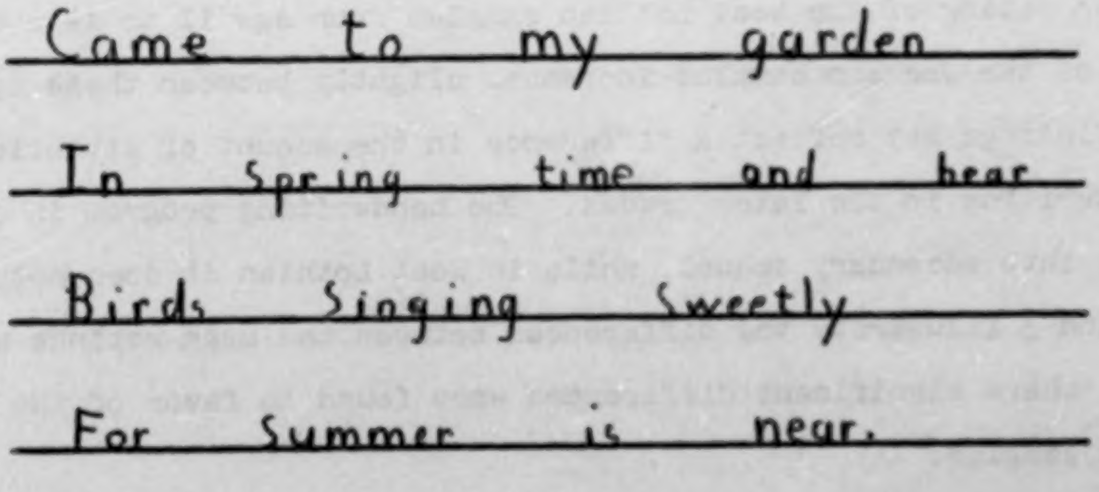
Comparison of West Lothian sample with the test norm at the same age as the sample. The testing in West Lothian included the administration of Gray's Oral Reading Test to a systematic sample of 50 children from the complete sample at age 7. One record was inadvertently erased from the

Jackson



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

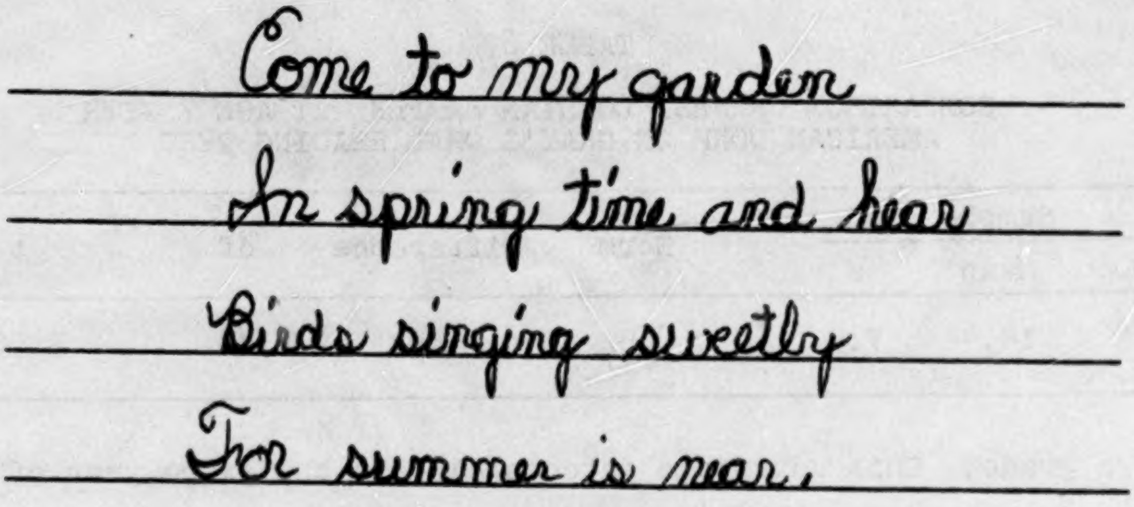
West Lothian



Came to my garden
In Spring time and hear
Birds Singing Sweetly
For Summer is near.

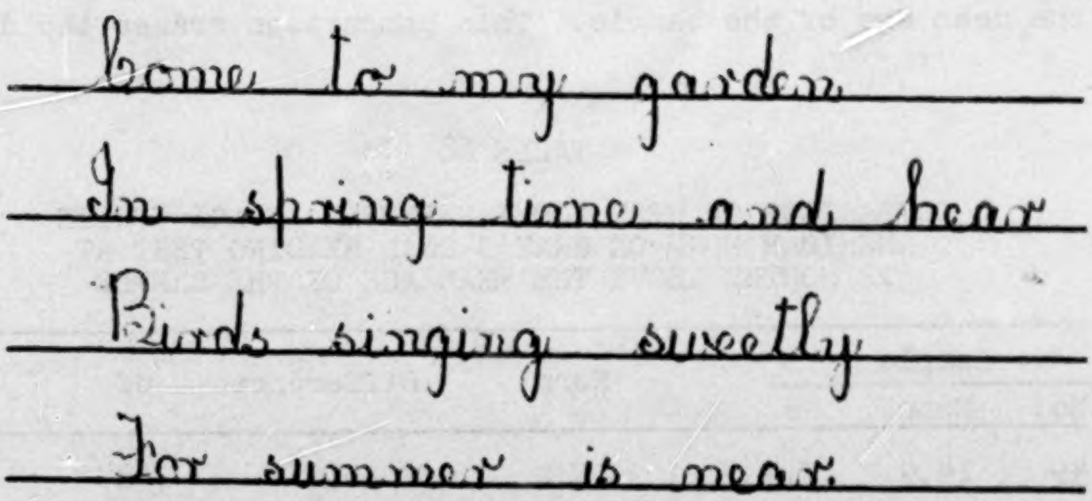
Exhibit 2. Representative examples of handwriting of Jackson and West Lothian samples at age 7.

Jackson



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

West Lothian



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 3. Representative examples of handwriting of Jackson and West Lothian samples at age 11.

tape. The mean score of the remaining 49 cases is compared with the test norm for American children of the same age in Table 67. The sample mean is significantly above the norm. The difference amounts to approximately 0.9 of a grade. This advantage matches closely the extra year of schooling West Lothian children gain by starting primary school at 5 rather than 6.

TABLE 67

COMPARISON OF WEST LOTHIAN SAMPLE AT AGE 7 WITH
AMERICAN NORM ON GRAY'S ORAL READING TEST

Sample			Norm	Difference	df	t
No.	Mean	s				
49	14.4	7.4	8.5	5.9	48	5.57**

Comparison of West Lothian sample with the test norm at 12 months above the mean age of the sample. Table 68 compares the mean score of the West Lothian sample with the American norm on Gray's test at a year above the mean age of the sample. This comparison erases the difference in favor of the West Lothian sample when the norm is computed at the same age as the sample. Once again, the results appear to be related to the years of schooling the children have had.

TABLE 68

COMPARISON OF WEST LOTHIAN SAMPLE AT AGE 7 WITH
AMERICAN NORM ON GRAY'S ORAL READING TEST AT
12 MONTHS ABOVE THE MEAN AGE OF THE SAMPLE

Sample			Norm	Difference	df	t
No.	Mean	s				
49	14.4	7.4	15.0	-0.6	48	.57

Comparison of Jackson and West Lothian samples. Table 69 offers a comparison between the mean scores of the West Lothian sample and a group of Jackson children on Gray's Oral Reading Test. A significant difference, equivalent to 0.8 of a grade, appears in favor of the West Lothian sample. These children continue to hold an advantage on this test roughly proportional to the time they gain by entering primary school at 5 rather than 6.

TABLE 69

COMPARISON OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Jackson			West Lothian			Difference	df	t
No.	Mean	s	No.	Mean	s			
50	9.06	6.70	49	14.39	7.44	-5.33	96	3.75**

Comparison of Jackson sample with test norm. Table 70 compares the mean score of the Jackson sample with the American norm on Gray's test. The sample mean virtually coincides with the norm. This finding suggests that the test norm remains dependable, especially since a group of normal intelligence was involved.

TABLE 70

COMPARISON OF JACKSON SAMPLE AT AGE 7 WITH AMERICAN NORM ON GRAY'S ORAL READING TEST

Sample			Norm	Difference	df	t
No.	Mean	s				
50	9.1	6.7	9.0	.1	49	.11

Comparison of Variances of West Lothian Samples and Groups of American Children on Achievement Tests

The analysis of the data would be incomplete without a comparison of the variances of the national samples at each age on each test. Among other things, educators want to know whether one educational system promotes greater variability than another, apart from differences between mean scores. A related question concerns the extent of overlap of the distributions. As a rule, the variation within groups is vastly greater than the difference between the mean scores of the samples. This individual variation typically results in considerable overlap of the distributions, even where the difference between means is statistically significant. These are important considerations, because they have a bearing on the educational significance which is to be attached to the difference between means.

The assessment of the significance of the differences between variances was done by the computation of the F ratio, $(\frac{s_1^2}{s_2^2}.)$, with the results interpreted in terms of the F distribution (Lindquist, 1940, pp. 60-6; Dixon and Massey, 1957, pp. 106-7). Asterisks are used to denote significance at the 1% (**) and 5% (*) levels of confidence.

Where significant differences between the variances of the samples on the achievement tests are reported, the variances of the samples' intelligence will also be compared, whenever possible. The object will be to ascertain whether the difference between the variances in achievement involves a difference of the same order between the variances in intelligence. This question arises because of the close correlation between achievement and mental test performance. The variances of the samples in chronological age will not be compared, since the correlations between age and achievement within grade groups are negligible. At no time is age a factor in connection with the comparisons of the Pinellas and West Lothian samples, since these groups were matched for this variable. The same applies to the groups of Pinellas children who were used in the comparisons with the Leeds samples.

PARAGRAPH MEANING

Table 71 shows that on the Stanford Paragraph Meaning Test the West Lothian samples were more variable than the Pinellas samples at all ages. Differences are significant at ages 7 and 14. The difference at age 14 occurs notwithstanding the fact that, as Table 72 shows, the Pinellas sample at this age was significantly more variable in intelligence than the West Lothian sample. Different mental tests were involved, but they yield comparable scores in the form of deviation IQ's. The variances in intelligence cannot be compared at age 7, where mental test data were not available on the West Lothian sample.

TABLE 71

COMPARISON OF VARIANCES OF PINELLAS AND WEST LOTHIAN SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Pinellas		West Lothian		df	F
	No.	Variance	No.	Variance		
7	318	94.45	318	112.57	317/317	.839*
11	383	50.97	383	55.80	382/382	.913
14	339	29.64	339	49.70	338/338	.596**

TABLE 72

COMPARISON OF VARIANCES OF PINELLAS AND WEST LOTHIAN SAMPLES IN INTELLIGENCE AT AGE 14

Pinellas		West Lothian		df	F
No.	Variance	No.	Variance		
339	139.93	339	82.81	338/338	1.69**

Table 73 shows the distribution of scores of the samples at each age on this test. Attention should be called especially to the distribution for the West Lothian sample at age 11, where 22 cases fall in the highest

TABLE 73

DISTRIBUTION OF SCORES OF PINELLAS AND WEST LOTHIAN SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Pinellas	W.Lothian	Pinellas	W.Lothian	Pinellas	W.Lothian
45-48	3	6	9	22		
42-44	6	20	20	23	12	12
39-41	14	29	32	50	44	32
36-38	8	43	57	56	81	45
33-35	19	38	67	55	79	46
30-32	10	28	61	52	49	51
27-29	23	26	49	46	32	51
24-26	30	29	38	34	24	37
21-23	37	13	22	23	12	33
18-20	39	24	16	10	4	14
15-17	38	21	5	7	2	13
12-14	36	15	5	4		4
9-11	34	14	2	1		1
6- 8	14	7				
3- 5	6	3				
0- 2	1	2				
Totals	318	318	383	383	339	339

interval. The Pinellas sample at this age is not as top heavy with high scores. The indication is that the variability of the West Lothian sample at this level was depressed by a failure of the test to provide sufficient ceiling, since this was the only age at which the West Lothian samples were not significantly more variable than the Pinellas samples in paragraph meaning.

Table 73 should not be dropped without a comment concerning the overlap of the distributions at each age. This is a clear demonstration of the fact that the overlap may be large, even where differences between mean scores are statistically significant. The differences between the mean scores on this test were significant at all ages. These differences favored the West Lothian samples at ages 7 and 11, but the Pinellas sample at age 14.

WORD MEANING

Table 74 compares the variances of the Pinellas and West Lothian samples on the Stanford Word Meaning Test. A significant difference was found only at age 11, where the Pinellas sample exhibits the greater variability. The West Lothian sample at this age, as shown in Table 75, was the more variable in intelligence, although not significantly so.

TABLE 74

COMPARISON OF VARIANCES OF PINELLAS AND WEST LOTHIAN SAMPLES ON STANFORD WORD MEANING TEST

Age	Pinellas		West Lothian		df	F
	No.	Variance	No.	Variance		
7	318	63.18	318	72.59	317/317	.870
11	383	62.36	383	51.55	382/382	1.210*
14	339	49.85	339	57.61	338/338	.865

TABLE 75

COMPARISON OF VARIANCES OF PINELLAS AND WEST LOTHIAN SAMPLES IN INTELLIGENCE AT AGE 11

Pinellas		West Lothian		df.	F
No.	Variance	No.	Variance		
383	123.47	383	140.66	382/382	.878

Table 76 reveals the distributions of these samples on the word meaning test. It is apparent from the comparatively high incidence of scores

TABLE 76

DISTRIBUTION OF SCORES OF PINELLAS AND WEST LOTHIAN SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Pinellas	W.Lothian	Pinellas	W.Lothian	Pinellas	W.Lothian
45-48			18	67	7	15
42-44			33	72	52	25
39-41			50	61	49	60
36-38	7	24	66	53	67	53
33-35	8	48	50	47	42	52
30-32	18	54	39	25	41	36
27-29	24	42	47	30	30	30
24-26	17	27	30	10	18	32
21-23	35	30	19	9	17	13
18-20	44	32	12	6	10	12
15-17	60	18	15	1	5	6
12-14	41	21	1	1	1	5
9-11	30	10	3	1		
6- 8	20	5				
3- 5	11	4				
0- 2	3	3				
Totals	318	318	383	383	339	339

in the top interval that the West Lothian sample at age 11 was handicapped by an inadequate test ceiling. The same factor applies to the West Lothian sample at age 7. The effect at both ages is to limit the variability of the samples. The results reported in Table 74 are affected accordingly.

SPELLING

Table 77 compares the variances of the Jackson and West Lothian samples on the Metropolitan Spelling Test. At ages 11 and 14, the Jackson samples are significantly more variable than West Lothian children. Table 78 shows that the Jackson sample at age 11 was also more variable in intelligence, although to less than a significant extent. A comparison of the samples' variances in intelligence at age 14 is not possible, since the mental measurements obtained at this level are not interchangeable.

TABLE 77

COMPARISON OF VARIANCES OF JACKSON AND WEST LOTHIAN SAMPLES ON METROPOLITAN SPELLING TEST

Age	Jackson		West Lothian		df	F
	No.	Variance	No.	Variance		
7	406	23.077	313	23.252	405/312	.992
11	402	112.424	380	62.932	401/379	1.608**
14	418	147.866	338	90.859	417/337	1.627**

TABLE 78

COMPARISON OF VARIANCES OF JACKSON AND WEST LOTHIAN SAMPLES IN INTELLIGENCE AT AGE 11

Jackson		West Lothian		df	F
No.	Variance	No.	Variance		
390	176.29	390	140.66	389/389	1.25

The distributions of these samples on the spelling test are shown in Table 79. The concentration of scores in the upper range at age 7, where the maximum score was 24, indicates that the test ceiling at this age was inadequate to test the best spellers in either group. This factor serves to reduce the variability of both groups, although the effect would

TABLE 79

DISTRIBUTION OF SCORES OF JACKSON AND WEST LOTHIAN SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Jackson	W.Lothian	Jackson	W.Lothian	Jackson	W.Lothian
48-50			4	79	13	18
45-47			24	101	30	45
42-44			31	58	28	39
39-41			40	40	36	41
36-38			40	37	37	50
33-35			44	18	42	29
30-32			30	16	31	33
27-29			35	10	34	29
24-26	20	61	42	5	33	15
21-23	80	122	27	5	26	15
18-20	116	45	27	5	25	8
15-17	94	38	22	3	23	6
12-14	41	20	16	1	18	2
9-11	31	14	9		15	2
6- 8	12	10	5	1	12	2
3- 5	10	1	5		7	2
0- 2	2	2	1	1	8	2
Totals	406	313	402	380	418	338

be greater on the West Lothian sample, because of the larger fraction of perfect scores. By the same token, the difference between the variances of the samples would tend to be minimized. As Table 77 shows, the difference at age 7 was negligible. The test at age 11 placed a similar restriction on the West Lothian sample.

HANDWRITING

The variances of the Jackson and West Lothian samples included in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 80. The Jackson samples are more variable at all ages, but only the difference at age 14 is significant. The variability of the samples on this instrument may be further studied by comparing the distributions shown in Table 81. These frequency tables continue to show a large amount of overlap of the distributions at each age, notwithstanding the discovery of significant differences between mean scores. The West Lothian samples had a significantly higher mean handwriting rating than the Jackson samples at both ages 7 and 11. The difference between the mean ratings at age 14 was not significant. Exhibits 4 and 5 illustrate the extremes of the distributions at age 14, where a significant difference was found between the variances of the samples on the handwriting scale.

TABLE 80
COMPARISON OF VARIANCES OF JACKSON AND WEST LOTHIAN SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Jackson		West Lothian		df	F
	No.	Variance	No.	Variance		
7	100	66.32	100	50.65	99/99	1.309
11	100	31.96	100	26.26	99/99	1.217
14	100	59.74	100	26.12	99/99	2.287**

TABLE 81

DISTRIBUTION OF RATINGS OF JACKSON AND WEST LOTHIAN SAMPLES ON METROPOLITAN HANDWRITING SCALE

Rating	Age 7		Age 11		Age 14	
	Jackson	W.Lothian	Jackson	W.Lothian	Jackson	W.Lothian
75			1	2	1	
70	2	6		5	9	1
65	7	12	7	14	9	6
60	16	27	10	32	12	26
55	26	29	53	44	38	50
50	25	16	21	3	17	11
45	11	8	7		10	5
40	9				4	
35	2	2				1
30	2		1			
Totals	100	100	100	100	100	100

ORAL READING

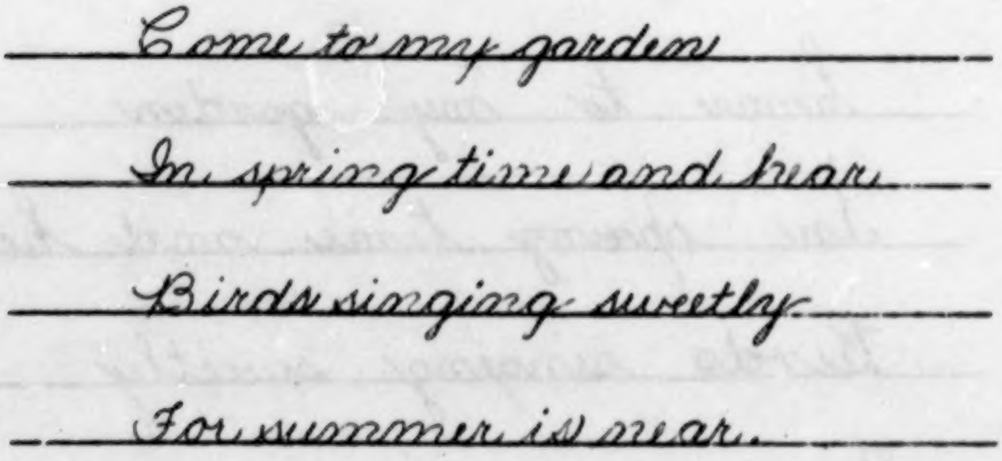
The variances of the Jackson and West Lothian samples at age 7 included in the study of oral reading are compared on Gray's Oral Reading Test in Table 82. A significant difference does not appear. The distributions of these samples on Gray's test are shown in Table 83. The Jackson sample includes one exceptional case at the upper end of the

TABLE 82

COMPARISON OF VARIANCES OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

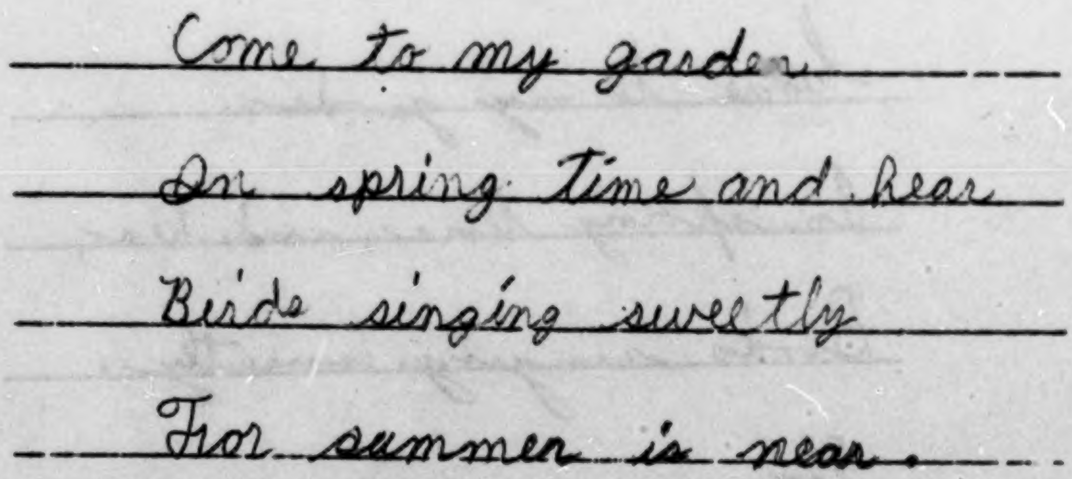
Jackson		West Lothian		df	F
No.	Variance	No.	Variance		
50	44.89	49	55.35	49/48	.811

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

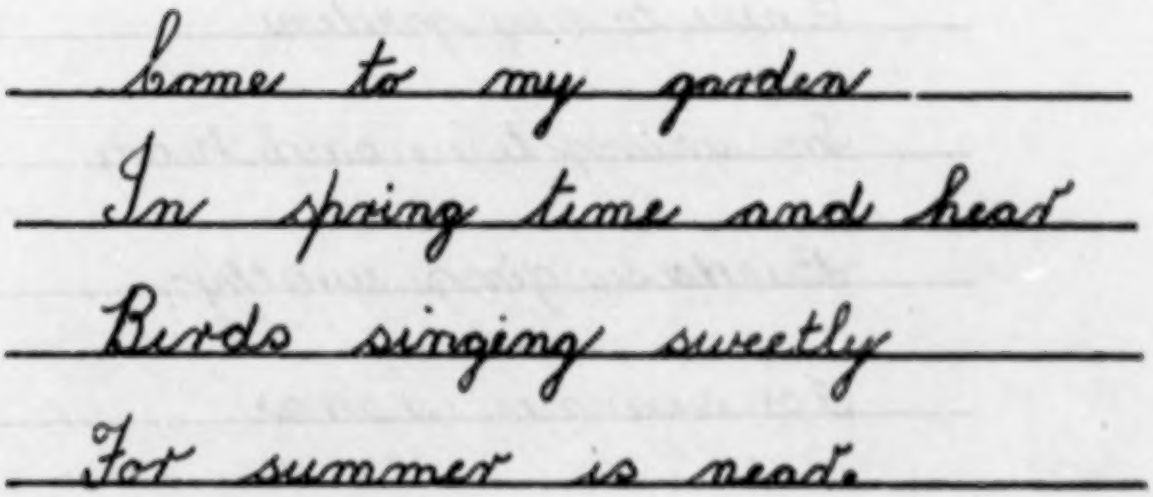
Lowest Rated



Come to my garden
On spring Time and hear
Birds singing sweetly
For summer is near.

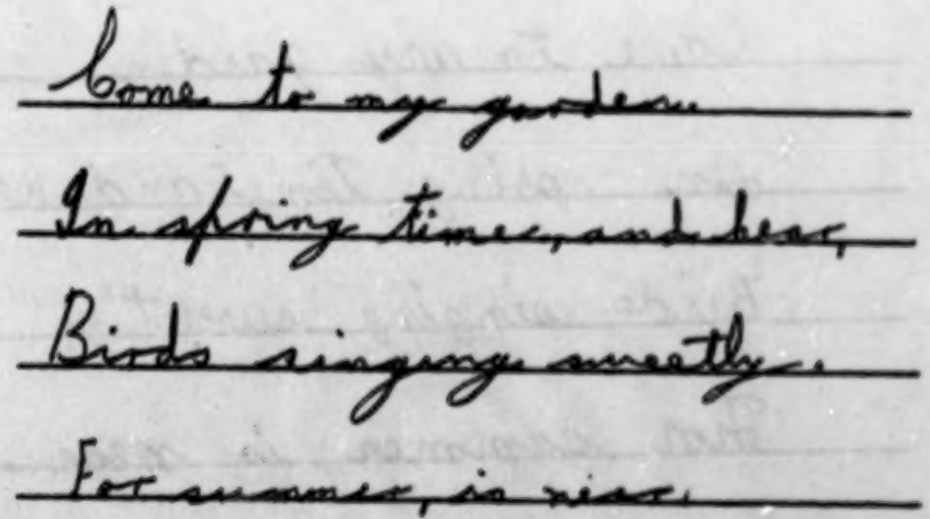
Exhibit 4. Contrast between highest and lowest rated products of handwriting in Jackson sample at age 14.

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Lowest Rated



Come to my garden
In spring time, and hear,
Birds singing sweetly.
For summer, is near.

Exhibit 5. Contrast between highest and lowest rated products of handwriting in West Lothian sample at age 14.

distribution, but in general the West Lothian scores tend to run higher. The difference between the mean oral reading scores of these samples significantly favored the West Lothian sample.

TABLE 83

DISTRIBUTION OF SCORES OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Jackson	West Lothian
28-29	1	
26-27		2
24-25		4
22-23		5
20-21		3
18-19	6	5
16-17	4	3
14-15	1	3
12-13	4	5
10-11	7	6
8- 9	6	4
6- 7	4	2
4- 5	4	2
2- 3	4	2
0- 1	9	3
Totals	50	49

Comparison of Mean Scores of Boys and Girls

The data collected lend themselves to a comparison of the boys and girls in the national samples on the achievement tests. The purposes of these comparisons have already been elucidated in the introduction. They will not, therefore, be repeated here. The mean scores will be compared first. The comparison of variances will follow in the next section.

WEST LOTHIAN SAMPLES

Paragraph meaning. Table 84 compares the mean scores of the boys and girls in the West Lothian samples on the Stanford Paragraph Meaning Test. At age 7, the mean score of the girls is significantly above that of the boys. At ages 11 and 14, the boys attained significantly higher mean scores. However, the differences at ages 11 and 14 are small in educational terms. This is especially true at age 14.

TABLE 84

COMPARISON OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	161	26.07	11.08	157	30.38	9.67	-4.31	3.72**
11	193	34.08	7.60	190	31.49	7.12	2.59	3.45**
14	152	31.05	6.94	187	29.42	7.08	1.63	2.12*

Word meaning. The mean scores of the boys and girls in the West Lothian samples on the Stanford Word Meaning Test are compared in Table 85. The same pattern is observed as on the paragraph meaning test. At age 7, the mean score of the girls is again significantly above that of the boys. The findings are of opposite sign at ages 11 and 14, where the boys have significantly higher mean scores, just as on the paragraph meaning test. The differences at ages 11 and 14 remain small.

TABLE 85

COMPARISON OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	161	23.55	9.31	157	26.96	7.25	-3.41	3.63**
11	193	38.38	7.39	190	36.87	6.88	1.51	2.06*
14	152	34.60	7.30	187	32.35	7.69	2.25	2.74**

Spelling. Table 86 presents the comparison of the mean scores of the boys and girls in the West Lothian samples on the Metropolitan Spelling Test. The mean scores of the girls are above those of the boys at all ages. The differences are significant at ages 7 and 14, but not at age 11.

TABLE 86

COMPARISON OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	159	18.66	5.34	154	20.70	3.98	-2.04	3.85**
11	192	40.81	9.04	188	42.22	6.57	-1.41	1.74
14	151	33.74	10.49	187	36.79	8.47	-3.05	2.88**

Handwriting. The mean ratings of the boys and girls in the West Lothian samples who were included in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 87. Differences are not significant at any age. Attention has previously been called to the decrease in the mean ratings of the West Lothian samples from age 11 to 14 when the mean is computed irrespective of sex. The present division according to sex reveals that this finding applies to both boys and girls.

TABLE 87

COMPARISON OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	No.	Boys		Girls		Difference	t
		Mean	s	Mean	s		
7	50	55.2	7.69	57.7	6.33	-2.5	1.78
11	50	59.1	5.32	58.9	4.98	0.2	0.19
14	50	55.6	4.49	56.0	5.71	-0.4	0.39

Oral reading. The mean scores of the boys and girls in the West Lothian sample of 49 children at age 7 who were the subjects for the study of oral reading are compared on Gray's Oral Reading Test in Table 88. A significant advantage appears in favor of the girls. The difference is equivalent to 0.8 of a grade.

TABLE 88

COMPARISON OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
23	11.87	7.65	26	16.62	6.62	-4.75	45	2.31*

PINELLAS SAMPLES

Paragraph meaning. Table 89 compares the mean scores of the boys and girls in the Pinellas samples on the Stanford Paragraph Meaning Test. A significant difference in favor of the girls is observed at age 7. Differences at ages 11 and 14 are not significant. The same comparison of the boys and girls in the West Lothian samples also yielded a significant difference in favor of the girls at age 7, but significant differences in favor of the boys at ages 11 and 14. The Pinellas samples do not give the same advantage to the boys at these ages.

TABLE 89

COMPARISON OF BOYS AND GIRLS IN PINELLAS SAMPLES
ON STANFORD PARAGRAPH MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	161	19.53	9.80	157	22.66	9.40	-3.13	2.91**
11	193	32.23	7.42	190	31.15	6.82	1.08	1.48
14	152	33.59	5.16	187	33.32	5.67	0.27	0.46

Word meaning. The relationship between the mean scores of the boys and girls in the Pinellas samples on the Stanford Word Meaning Test is shown in Table 90. The girls maintain a significant advantage at age 7, while the differences at ages 11 and 14 remain negligible. Significant differences were found between the boys and girls in the West Lothian samples at all ages on this test, just as on the paragraph meaning test. The differences on both tests favored the girls at age 7, but the boys at ages 11 and 14. The results of the comparisons of the boys and girls in the Pinellas samples on these tests are similar only at age 7.

TABLE 90

COMPARISON OF BOYS AND GIRLS IN PINELLAS SAMPLES
ON STANFORD WORD MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	161	17.02	8.19	157	19.31	7.55	-2.29	2.59**
11	193	32.77	8.36	190	33.03	7.41	-0.26	0.322
14	152	34.32	7.16	187	34.47	7.00	-0.15	0.191

JACKSON SAMPLES

Spelling. Table 91 shows how the mean scores of the boys and girls in the Jackson samples compared on the Metropolitan Spelling Test. The mean scores of the girls are significantly above those of the boys at all ages. These differences exceed the differences which were found in favor of the girls when the mean scores of the boys and girls in the West Lothian samples were compared on this test.

TABLE 91

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES
ON METROPOLITAN SPELLING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	181	15.74	5.49	225	18.01	3.90	-2.27	4.73**
11	197	27.73	11.04	205	31.86	9.78	-4.13	3.97**
14	201	26.18	12.60	217	31.52	11.17	-5.34	4.56**

Handwriting. The mean ratings of the boys and girls in the Jackson samples who were involved in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 92. The girls exceed the mean ratings of the boys at all ages. Differences are significant at ages 11 and 14. No significant differences were found between the mean ratings of the boys and girls in the West Lothian samples on this measure. Ex-

TABLE 92

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES
ON METROPOLITAN HANDWRITING SCALE

Age	No.	Boys		Girls		Difference	t
		Mean	s	Mean	s		
7	50	51.1	9.38	53.3	6.59	-2.2	1.36
11	50	52.5	5.46	56.3	5.23	-3.8	3.55**
14	50	52.5	6.33	58.7	7.81	-6.2	4.36**

hibits 6 and 7 illustrate the differences between the mean ratings of the boys and girls in the Jackson samples at ages 11 and 14, where significant differences were found in favor of the girls.

Oral reading. The mean scores of the boys and girls in the Jackson sample of 50 children at age 7 whose oral reading was tested are compared on Gray's Oral Reading Test in Table 93. The girls have a higher mean score than the boys, but the difference is not significant. A similar comparison of West Lothian children yielded a significant difference in favor of the girls.

TABLE 93

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLE
AT AGE 7 ON GRAY'S ORAL READING TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
26	7.27	5.41	24	11.00	7.51	-3.73	43	1.99

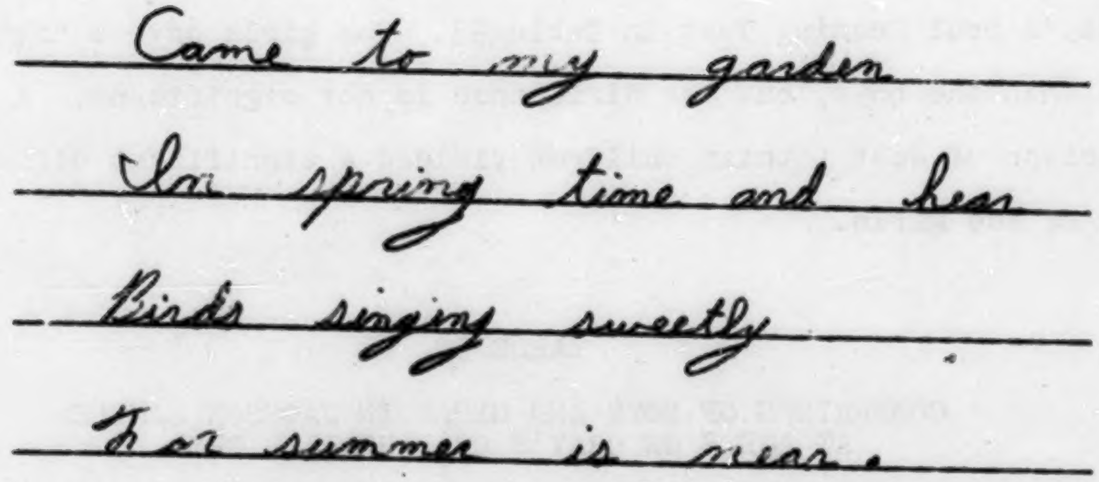
Comparison of Variances of Boys and Girls

It remains to compare the variances of the boys and girls in the national samples on the achievement tests. The stage was set for these comparisons in the introduction. No further explanation is required here.

WEST LOTHIAN SAMPLES

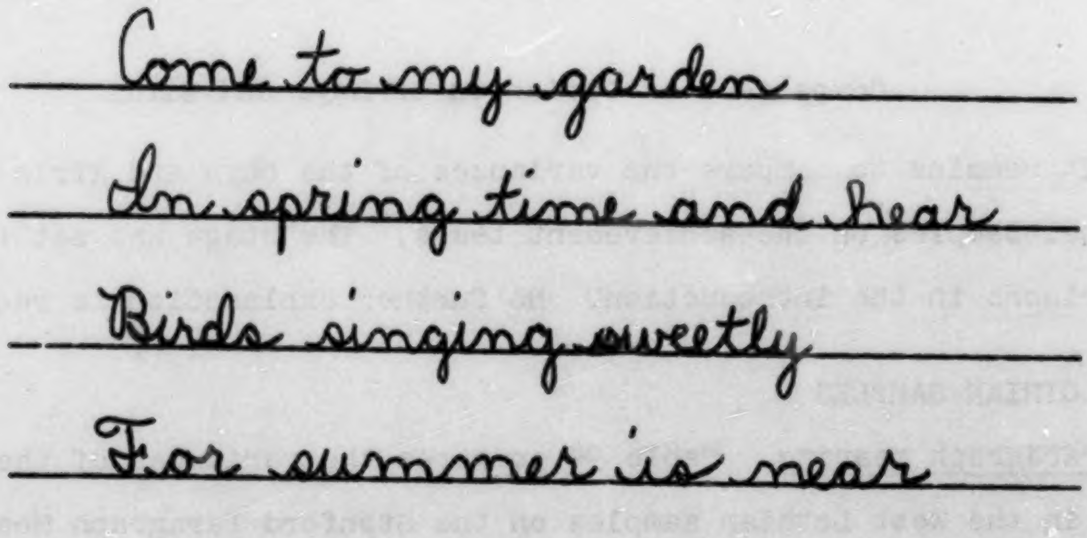
Paragraph meaning. Table 94 compares the variances of the boys and girls in the West Lothian samples on the Stanford Paragraph Meaning Test. No significant differences occur. Table 95 shows how the scores of these boys and girls were distributed on the paragraph meaning test. It may be recalled that significant differences between the mean scores of the present samples were found on this test at all ages. These differences favored the girls at age 7, but gave the advantage to the boys at ages 11

Boys



Came to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

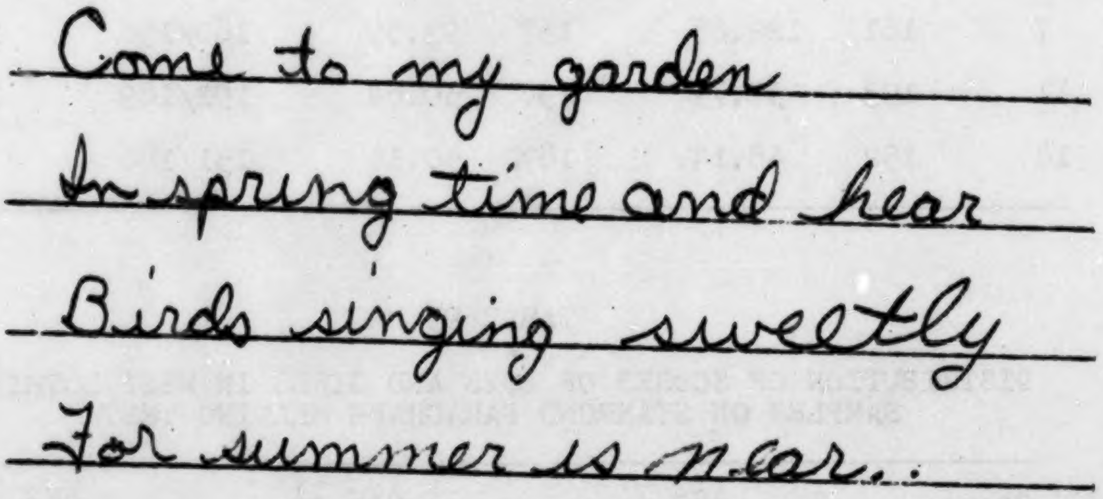
Girls



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near

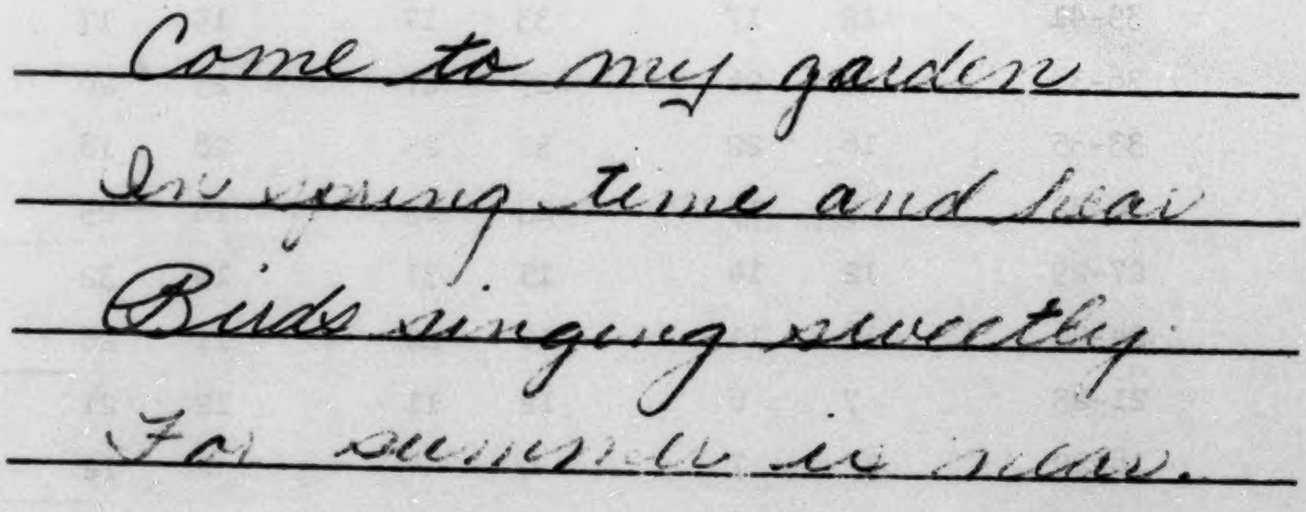
Exhibit 6. Representative examples of handwriting of boys and girls in Jackson sample at age 11.

Boys



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near..

Girls



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 7. Representative examples of handwriting of boys and girls in Jackson sample at age 14.

TABLE 94

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	161	122.66	157	93.59	160/156	1.31
11	193	57.79	190	50.64	192/189	1.14
14	152	48.14	187	50.10	151/186	.961

TABLE 95

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48	3	3	16	6		
42-44	9	11	14	9	4	8
39-41	12	17	33	17	15	17
36-38	17	26	29	27	25	20
33-35	16	22	30	25	28	18
30-32	9	19	23	29	26	25
27-29	12	14	15	31	19	32
24-26	18	11	10	24	11	26
21-23	7	6	12	11	12	21
18-20	17	7	6	4	2	12
15-17	13	8	3	4	6	7
12-14	9	6	1	3	3	1
9-11	10	4	1		1	
6- 8	6	1				
3- 5	2	1				
0- 2	1	1				
Totals	161	157	193	190	152	187

and 14. The differences on the average however are small, when compared with the individual variation within groups. Both boys and girls occupy virtually every interval of the distributions. This is another demonstration of the fact that the overlap of the distributions may be large, even where differences between mean scores are statistically significant.

Word meaning. Table 96 examines the differences between the variances of the boys and girls in the West Lothian samples on the Stanford Word Meaning Test. Differences are significant only at age 7, where the boys show the greater variability. The scores of these samples on this test are distributed in Table 97. The same remarks apply as in the case of the paragraph meaning test, although a note may be added regarding the distributions at age 11, where the test lacked adequate ceiling. This factor limits the variability of both groups and tends to "spoil" the comparison of variances between groups, especially since it does not appear to apply equally to the samples compared. More boys than girls populate the high end of the scale. The test ceiling was less of a factor at the other ages, although the distributions at all ages tend to be negatively skewed with the bulk of the scores in the middle and upper ranges. It is obvious that this test did not do complete justice to the West Lothian samples.

TABLE 96

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	161	86.71	157	52.58	160/156	1.65**
11	193	54.63	190	47.36	192/189	1.15
14	152	53.29	187	57.08	151/186	.934

TABLE 97

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48			46	21	8	7
42-44			41	31	11	14
39-41			27	34	34	26
36-38	10	14	23	30	30	23
33-35	23	25	18	29	21	31
30-32	24	30	8	17	16	20
27-29	14	28	16	14	8	22
24-26	12	15	3	7	11	21
21-23	15	15	6	3	6	7
18-20	20	12	4	2	3	9
15-17	11	7		1	2	4
12-14	16	5		1	2	3
9-11	6	4	1			
6- 8	4	1				
3- 5	4					
0- 2	2	1				
Totals	161	157	193	190	152	187

Spelling. The variances of the boys and girls in the West Lothian samples on the Metropolitan Spelling Test are compared in Table 98. At each age, the boys are significantly more variable than the girls. Table 99 shows that the boys at age 11 were also significantly more variable in intelligence, but the same is not true at age 14, where virtually no difference occurs between the samples' variances in mental test performance.

TABLE 98

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	159	28.49	154	15.87	158/153	1.80**
11	192	81.70	188	43.10	191/187	1.90**
14	151	110.08	187	71.69	150/186	1.54**

TABLE 99

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES IN INTELLIGENCE AT AGES 11 AND 14

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
11	197	166.67	193	112.78	196/192	1.48**
14	147	82.08	175	83.72	146/174	.980

The distributions shown in Table 100 disclose that the greater variability of the boys in the West Lothian samples on the spelling test springs mainly from the fact that the poorest spellers at each age were predominantly boys. There are very few girls in the lower brackets. This is especially true at age 11. On the other hand, the most skillful spellers at each age include a fair share of boys. In general, however, the scores of the girls run higher. It should be noted in passing that the distributions of both the boys and girls on this test tend to be negatively skewed, just as on the word meaning test. Of all tests, the spelling test was the easiest for the West Lothian samples.

TABLE 100

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
48-50			40	39	8	10
45-47			50	51	14	31
42-44			28	30	16	23
39-41			16	24	20	21
36-38			19	18	21	29
33-35			10	8	8	21
30-32			8	8	20	13
27-29			6	4	13	16
24-26	25	36	3	2	7	8
21-23	56	66	2	3	7	8
18-20	20	25	4	1	5	3
15-17	26	12	3		4	2
12-14	10	10	1		2	
9-11	11	3			1	1
6- 8	9	1	1		1	1
3- 5	1				2	
0- 2	1	1	1		2	
Totals	159	154	192	188	151	187

Handwriting. The variances of the boys and girls in the West Lothian samples whose handwriting was rated are compared on the Metropolitan Handwriting Scale in Table 101. Differences are not significant at any age. The distributions in connection with this comparison appear in Table 102. The spread is not as wide as on other tests because of the nature of the instrument, but the overlap of the distributions is no less

TABLE 101

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	50	59.14	50	40.01	49/49	1.478
11	50	28.26	50	24.79	49/49	1.140
14	50	20.14	50	32.65	49/49	.617

pronounced. Differences between the mean ratings of these boys and girls on the handwriting scale were not significant at any age.

TABLE 102

DISTRIBUTION OF RATINGS OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLES ON METROPOLITAN HANDWRITING SCALE

Rating	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
75			1	1		
70	2	4	3	2		1
65	6	6	7	7	3	3
60	12	15	16	16	11	15
55	13	16	21	23	28	22
50	10	6	2	1	5	6
45	5	3			3	2
40						
35	2					1
30						
Totals	50	50	50	50	50	50

Oral reading. The variances of the boys and girls in the West Lothian sample at age 7 included in the study of oral reading are compared on Gray's Oral Reading Test in Table 103. A significant difference does not occur. Table 104 shows that the scores of the girls tend to run higher than those of the boys, but the variation is much the same for

TABLE 103

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys		Girls		df	F
No.	Variance	No.	Variance		
23	58.52	26	43.82	22/25	1.34

TABLE 104

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN WEST LOTHIAN SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Boys	Girls
28-29		
26-27		2
24-25		4
22-23	2	3
20-21	3	
18-19	3	2
16-17	1	2
14-15	1	2
12-13	2	3
10-11	1	5
8- 9	2	2
6- 7	2	
4- 5	2	
2- 3	1	1
0- 1	3	
Totals	23	26

both. It has previously been demonstrated that the mean score of the girls in this case was significantly above that of the boys.

PINELLAS SAMPLES

Paragraph meaning. Table 105 compares the variances of the boys and girls in the Pinellas samples on the Stanford Paragraph Meaning Test. Differences are not significant at any age. The outcome of the same comparison of the boys and girls in the West Lothian sample was similar. No significant differences were found in either case.

TABLE 105

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	161	96.05	157	88.42	160/156	1.086
11	193	55.04	190	46.50	192/189	1.184
14	152	26.64	187	32.20	151/186	.827

The distributions of the present samples on this test may be viewed in Table 106. There is little to say, except to call attention again to the extent of overlap at each age. This is the one observation that applies "across the board."

TABLE 106

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48	2	1	5	4		
42-44	3	3	14	6	4	8
39-41	6	8	16	16	20	24
36-38	3	5	32	25	39	42
33-35	8	11	35	32	33	46
30-32	4	6	27	34	23	26
27-29	7	16	24	25	17	15
24-26	11	19	18	20	8	16
21-23	17	20	5	17	7	5
18-20	20	19	10	6	1	3
15-17	25	13	3	2		2
12-14	20	16	3	2		
9-11	20	14	1	1		
6- 8	9	5				
3- 5	6					
0- 2		1				
Totals	161	157	193	190	152	187

Word meaning. The variances of the boys and girls in the Pinellas samples on the Stanford Word Meaning Test are compared in Table 107. The variance of the boys is greater at each age, but differences are not significant. Differences between the variances of the boys and girls in the West Lothian samples on this test were also small, although a significant difference was found at age 7, where the boys were more variable.

The distributions of the boys and girls in the Pinellas samples on

TABLE 107

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	161	67.07	157	56.94	160/156	1.178
11	193	69.96	190	54.93	192/189	1.274
14	152	51.93	187	51.19	151/186	1.015

this test are shown in Table 108. The individual variation within each sex results in the customary overlap of the distributions observed on

TABLE 108

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48			9	9	3	4
42-44			18	15	19	33
39-41			27	23	30	19
36-38	4	3	34	32	28	39
33-35	2	6	20	30	19	23
30-32	8	10	18	21	16	25
27-29	13	11	20	27	11	19
24-26	7	10	18	12	10	8
21-23	13	22	11	8	9	8
18-20	21	23	7	5	4	6
15-17	25	35	9	6	2	3
12-14	23	18		1	1	
9-11	23	7	2	1		
6- 8	14	6				
3- 5	6	5				
0- 2	2	1				
Totals	161	157	193	190	152	187

other tests. It may also be noted that the ceiling of the test at ages 7 and 11 placed less of a damper on the Pinellas than on the West Lothian samples at these ages, but without any radical change in results. The differences between the variances of boys and girls on the word meaning test were small for both national samples at all ages.

JACKSON SAMPLES

Spelling. The differences between the variances of the boys and girls in the Jackson samples on the Metropolitan Spelling Test are reported in Table 109. The boys are more variable than the girls at all ages, but only the difference at age 7 is significant. Table 110 shows that the difference at this age cannot be attributed to the fact that the boys were also significantly more variable in intelligence. Incidentally, when the variances of the boys and girls in the West Lothian samples were

TABLE 109

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	181	30.14	225	15.19	180/224	1.98**
11	197	121.77	205	95.55	196/204	1.27
14	201	158.73	217	124.68	200/216	1.27

TABLE 110

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLE IN INTELLIGENCE AT AGE 7

Boys		Girls		df	F
No.	Variance	No.	Variance		
181	144.48	225	147.14	180/224	.982

compared on the spelling test, it was found that the boys were significantly more variable at all ages.

Table 111 shows how the distributions of the boys and girls in the Jackson samples compared on the spelling test. The within-group variation once again results in vast overlap of the distributions at each age,

TABLE 111

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
48-50			1	3	2	11
45-47			9	15	14	16
42-44			10	21	11	17
39-41			19	21	13	23
36-38			18	22	16	21
33-35			18	26	18	24
30-32			17	13	12	19
27-29			17	18	12	22
24-26	9	11	19	23	13	20
21-23	27	53	13	14	16	10
18-20	42	74	16	11	17	8
15-17	43	51	15	7	17	6
12-14	21	20	9	7	11	7
9-11	19	12	6	3	11	4
6- 8	8	4	4	1	8	4
3- 5	10		5		5	2
0- 2	2		1		5	3
Totals	181	225	197	205	201	217

even though the mean scores of the girls were significantly above those of the boys in all comparisons on this test. These distributions are not as negatively skewed as were the spelling scores of the boys and girls in the West Lothian samples. This is a reflection of the superior spelling ability of the West Lothian samples. This table should not be dropped without noting that boys outnumber girls among the "hard core" of poorest spellers, just as in the West Lothian samples, although perhaps not with the same vengeance. This is to say that the poorest spellers in West Lothian are even more apt to be boys than in Jackson, if you can judge by the samples represented in Tables 100 and 111.

Handwriting. The variances of the boys and girls in the Jackson samples whose handwriting was rated are compared on the Metropolitan Handwriting Scale in Table 112 (*cf*. Table 110). A significant difference appears only at age 7, where the boys are more variable. A similar comparison of West Lothian boys and girls failed to produce significant differences at any age. The distributions of the boys and girls in the Jackson samples on the handwriting scale may be compared in Table 113. The greater variability of the boys at age 7 is apparent from this table. Exhibits 8 and 9 illustrate the extremes of the distributions at this age.

TABLE 112

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	50	88.05	50	43.48	49/49	2.025*
11	50	29.85	50	27.36	49/49	1.091
14	50	40.05	50	61.03	49/49	.656

TABLE 113

DISTRIBUTION OF RATINGS OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN HANDWRITING SCALE

Rating	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
75				1		1
70	2					9
65	3	4	1	6	4	5
60	8	8	3	7	4	8
55	8	18	27	26	19	19
50	14	11	11	10	12	5
45	6	5	7		8	2
40	5	4			3	1
35	2					
30	2		1			
Totals	50	50	50	50	50	50

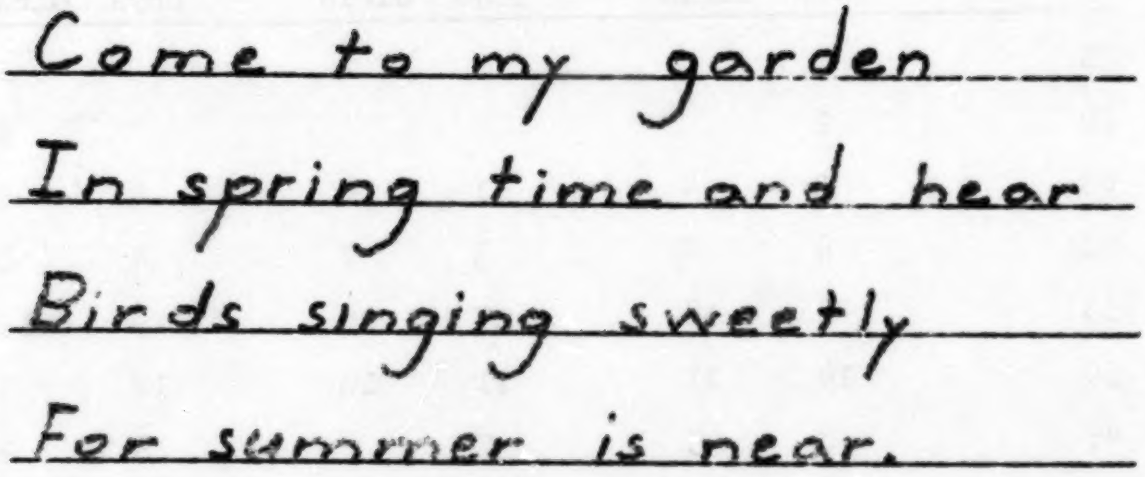
Oral reading. The variances of the boys and girls in the Jackson sample at age 7 participating in the study of oral reading are compared on Gray's Oral Reading Test in Table 114. The difference is not significant. A similar failure to find a significant difference was observed when the variances of the boys and girls in the corresponding West

TABLE 114

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

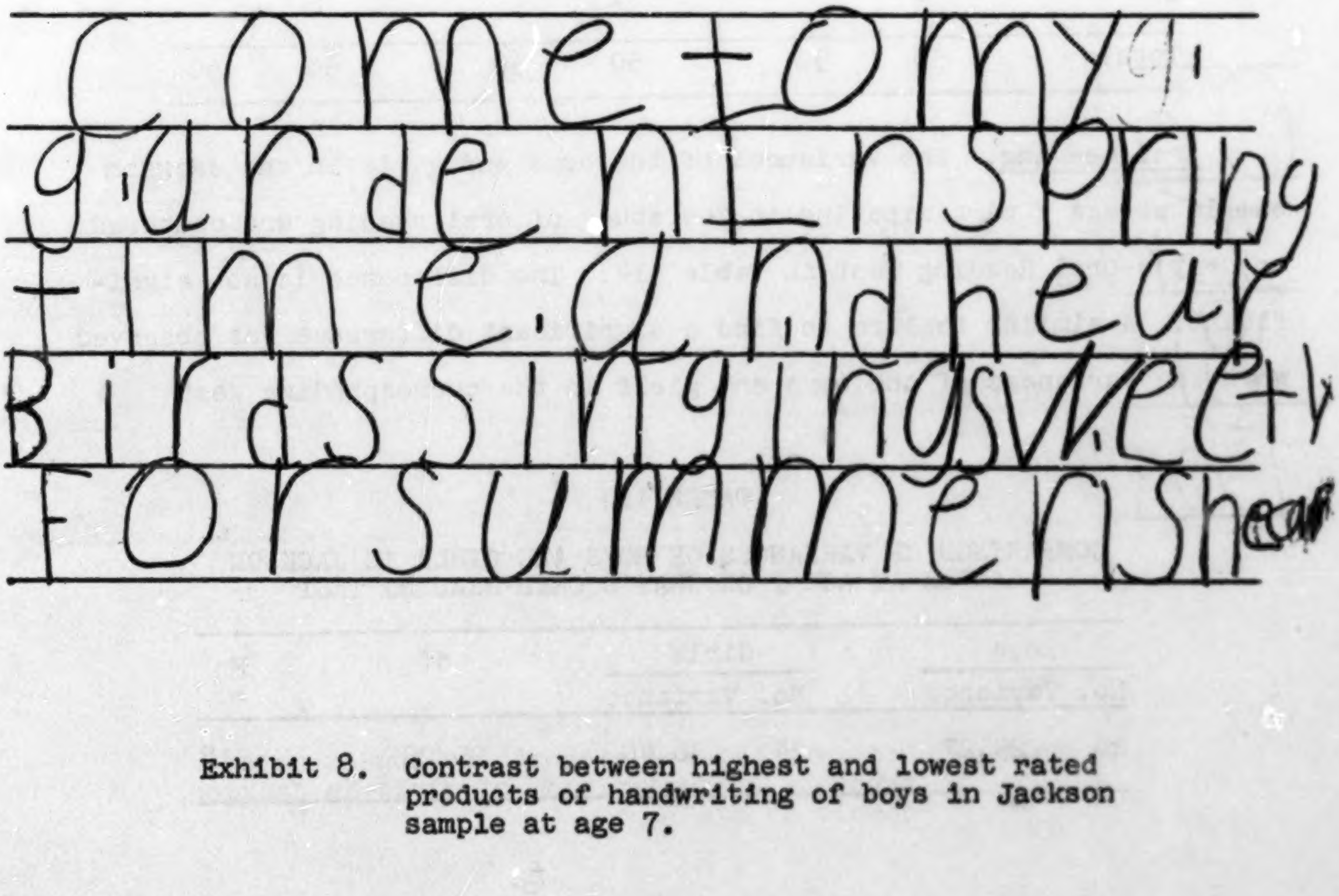
Boys		Girls		df	F
No.	Variance	No.	Variance		
26	29.27	24	56.40	25/23	.518

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

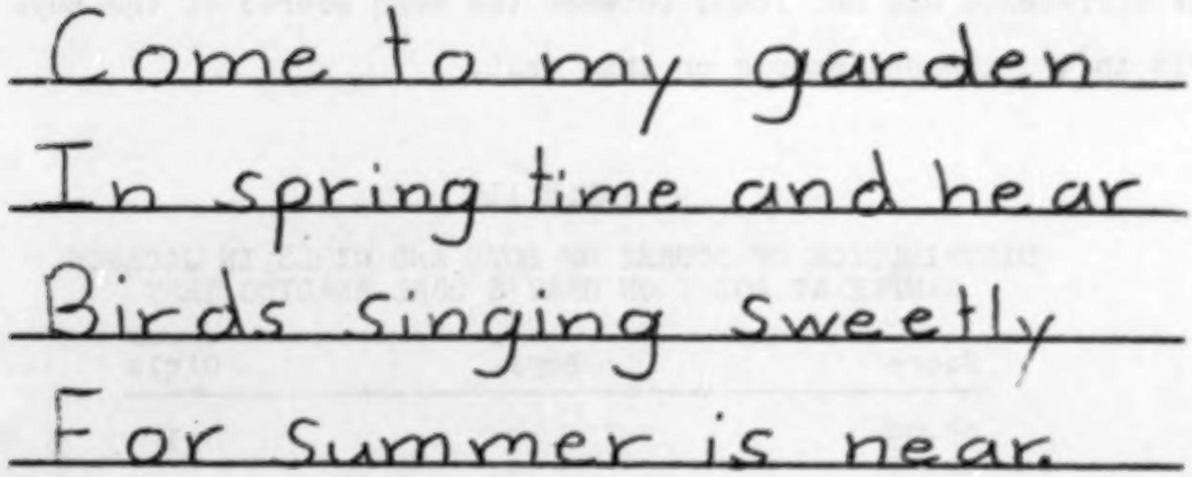
Lowest Rated



Come to my g
garden In spring
time and hear
Birds singing sweetly
For summer is hear

Exhibit 8. Contrast between highest and lowest rated products of handwriting of boys in Jackson sample at age 7.

Highest Rated


Come to my garden
In spring time and hear
Birds singing Sweetly
For summer is near.

Lowest Rated

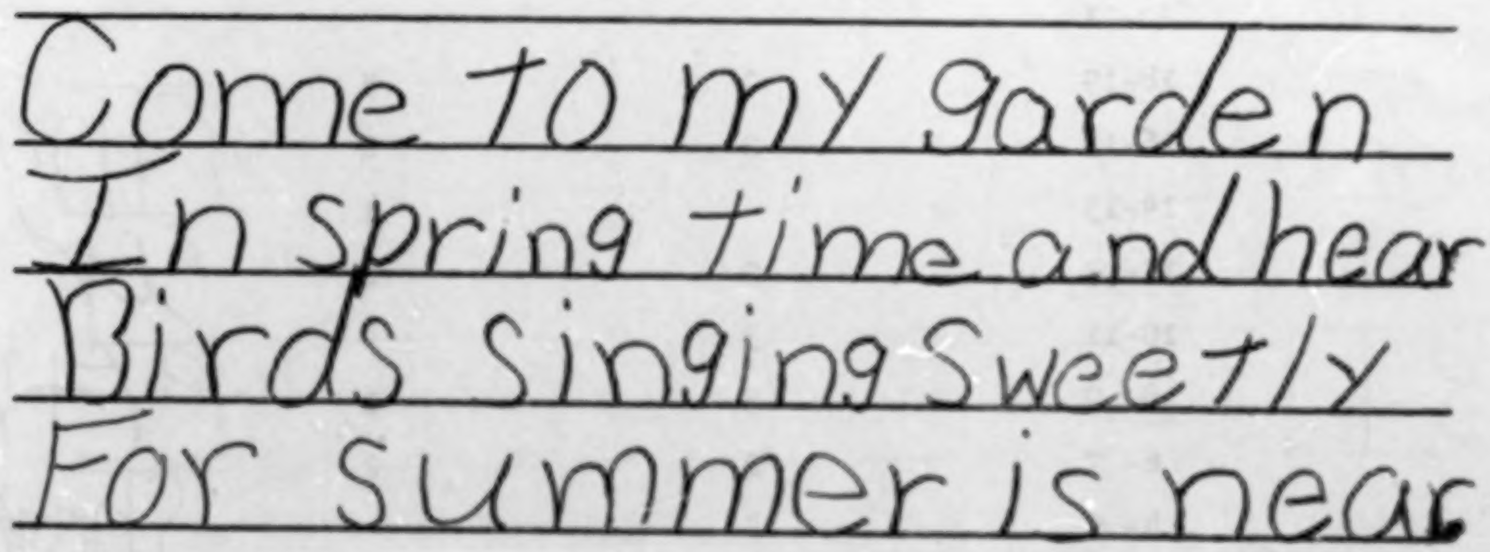

Come to my garden
In spring time and hear
Birds singing Sweetly
For summer is near

Exhibit 9. Contrast between highest and lowest rated products of handwriting of girls in Jackson sample at age 7.

Lothian sample were compared on this test. The distributions associated with the present comparison are shown in Table 115. The distribution for the girls includes a "lonesome end," but otherwise the scores cover the same general range and there is little to choose either way. A significant difference was not found between the mean scores of the boys and girls in the present sample on this test.

TABLE 115

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Boys	Girls
28-29		1
26-27		
24-25		
22-23		
20-21		
18-19	1	5
16-17	2	2
14-15		1
12-13	2	2
10-11	3	4
8- 9	5	1
6- 7	2	2
4- 5	4	
2- 3	2	2
0- 1	5	4
Totals	26	24

Comparison of Spelling Errors of Jackson and West Lothian Samples[1]

This section is devoted to a comparison of the spelling errors of the Jackson and West Lothian samples. The object is to ascertain the extent to which the samples might differ in their application of phonics to spelling, since the attention given to phonics in school is one of the differences in practice being investigated. While it is true that the method of attack cannot be identified when words are spelled correctly, mistakes on unknown words often reveal the attack used. A comparison will first be made of the most common misspellings of the samples. This will be followed by a comparison of the readability of the mistakes of Jackson and West Lothian children. We already know that the West Lothian samples are very strong spellers. Perhaps these comparisons will shed light on the secret of their success.

COMPARISON OF MOST COMMON MISSPELLINGS

Tables 116, 117, and 118 compare the most frequent errors of the Jackson and West Lothian samples on the words of the spelling tests. Phonetic misspellings are underlined. The criterion used for this classification was whether the word could be understood when pronounced as misspelled. At age 7, misspellings were defined as phonetic if the letters used could in English have the sounds ascribed to them, either as individual letters or as constellations of letters. At ages 11 and 14, the same criterion was applied, except that the letter had to be capable of producing the correct sound in the position in which it was used. At age 7, for example, g might have the sound guh or juh, whereas, at age 14, g had to have the sound guh when followed by a, o, or u and the sound juh when followed by e or i. Moreover, phonetic spellings of mispronuncia-

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[1] This section is adapted from a doctoral study by Personke (1963), who based his dissertation on the West Lothian comparisons with American children in spelling.

TABLE 116

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7

Test Word	Most Common Error		Frequency of Error	
	Jackson	West Lothian	Jackson	West Lothian
1. cow	com, cwt cim, how	caw	1	3
2. good	doog	god	2	8
3. she	her	*	2	
4. can	came	came	2	2
5. red	rad	read	10	3
6. her	hear	hir	7	25
7. ball	boll	boll	10	39
8. week	weak	weak	4	7
9. little	littel	littel	10	15
10. came	come	cam	3	17
11. ran	run	rum, ram	24	2
12. ride	rade	rid	7	15
13. cake	cate	cack	3	17
14. our	ore	oer	11	5
15. night	nigth	nite	10	19
16. send	sent	sent	57	9
17. inside	insind	in-side	15	18
18. light	like	lite	10	48
19. pencil	pensel	pensil	13	26
20. garden	garder	gardin	10	6
21. basket	baskit	bascet	20	22
22. short	sort	sort	26	21
23. bread	bred	bred	32	38
24. write	right	rite	98	51

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*In West Lothian, 7 different misspellings were discovered for this word, each one used only once.

TABLE 117

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 11

Test Word	Most Common Error		Frequency of Error	
	Jackson	West Lothian	Jackson	West Lothian
1. lost	losed	loost	4	2
2. funny	funney	funy	4	4
3. study	studie	studdy	6	4
4. these	thease	theese	6	7
5. sound	sownd	soond	2	2
6. lie	lye	lye	15	7
7. hurt	hert	hirt	16	2
8. leave	leve	leeve	23	4
9. bottle	bottel	bottel	12	2
10. blood	blod	blud	8	5
11. pumps	punps	pumpes	8	4
12. knew	new	new	58	17
13. whom	hom	hom, hoom	11	2
14. wore	ware	woar, woare	14	2
15. vacation	vaction	vaccation	28	11
16. wrong	worng	wronge	9	5
17. straw	staw	strow	14	5
18. interesting	interresting intresting enteresting	intresting	6 6 6	29
19. fountain	founten	fountian	22	8
20. bowl	boul	boul, boal	9	6
21. allowed	aloud	aloud	118	47
22. swept	sweep	sweept	18	6
23. prepared	prepard	prepaired	20	14
24. cousin	cousen	cusin	12	6
25. pickle	pickel	pickel	95	12

TABLE 117 (concluded)

Test Word	Most Common Error		Frequency of Error	
	Jackson	West Lothian	Jackson	West Lothian
26. whose	who's	whoes	76	8
27. limb	lim	lim	36	19
28. soldier	solder	soilder	28	7
29. usual	usal	usuall	23	6
30. flutter	fluter	fluter	45	16
31. fare	fair	fair	70	29
32. admission	admition	addmission	48	37
33. material	materal	matterial	19	11
34. athletics	atheletics	athletices	19	7
35. examination	examanation	examanation	34	9
36. liquor	licker	liquer	54	39
37. electricity	electricty	electrisity	48	16
38. disappointed	disapointed	disapointed	163	68
39. attitude	atitude	atitude	62	115
40. patience	patients	patients	136	11
41. quantities	quanties	quantites	40	34
42. obedient	obedent	obediant	50	23
43. vacancy	vacency	vacansy	15	33
44. gymnasium	gymnasiam	jimnasium	10	25
45. principal	principle	principle	47	13
46. associate	asociate	assosiate	21	29
47. algebra	algerbra	algibra	48	87
48. deceive	decieve	decieve	83	48
49. assistance	asistance	asistance	29	18
50. thoroughly	throughly	thuroly	35	17

TABLE 118

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 14

Test Word	Most Common Error		Frequency of Error	
	Jackson	West Lothian	Jackson	West Lothian
1. allowed	aloud	aloud	108	28
2. swept	sweept	sweeped	14	4
3. prepared	prepaired	prepaired	11	5
4. cousin	couson	cusin	5	2
5. pickle	pickel	pickel	106	5
6. whose	who's	who's	56	23
7. limb	lim	lim	10	13
8. soldier	solder	soilier	19	2
9. usual	usually	usuall	9	5
10. flutter	fluter	fluter	18	5
11. fare	fair	fair	69	4
12. admission	addmission	addmission	28	29
13. material	materal matereal matterial	matieral	6 6 6	3
14. athletics	atheletics	atheletic	34	3
15. examination	examanation	examation	19	3
16. liquor	liquer	liquer	30	61
17. electricity	electricty	electrisity	28	2
18. disappointed	disapointed	disapointed	59	41
19. attitude	atitude	atitude	56	68
20. patience	patients	patients	63	9
21. quantities	quanities	quanties	39	12
22. obedient	obediant	obediant	45	29
23. vacancy	vaccancy	vaceney	15	12
24. gymnasium	gynasium	gymnasiam	14	10
25. principal	principle	principle	92	31
26. associate	asociate	assosiate	12	27

TABLE 118 (concluded)

Test Word	Most Common Error		Frequency of Error	
	Jackson	West Lothian	Jackson	West Lothian
27. algebra	algerbra	algabra	29	28
28. deceive	decieve	decieve	128	57
29. assistance	assistence	asistance	35	9
30. thoroughly	throughly	thourghly	90	25
31. straightened	straighten	straitened	26	22
32. patronage	patrinage	patrionage	35	11
33. capacity	capasity	capasity	46	32
34. courteous	courtious	courtious	66	60
35. advantageous	advantagous	advantagous	44	34
36. comparatively	comparitively	comparitively	102	60
37. schedule	schedual	schedual	33	40
38. insignificant	insignifigant	incignificant	23	24
39. ridiculous	rediculous	rediculous	92	41
40. physician	physican	physian	40	14
41. unanimous	unanamous	unanimus	35	19
42. approximately	approximatly	approximatly	46	26
43. emphasizes	emphisizes	emphasises	32	83
44. inconvenience	inconvience	inconveniance	67	25
45. specifically	specificly	specificaly	30	19
46. analysis	analisis	analyses	47	20
47. supplementary	suplementary	suplimentary	33	45
48. criticism	critisism	critisism	37	43
49. simultaneous	simotanious	similtanious	22	33
50. prejudice	predjudice	predudice	40	71

tions were included in the category of phonetic misspellings. For example, algerbra was accepted as a phonetic rendition of algebra in Jackson. Local dialect was also taken into account. Thus, soond was accepted for sound in West Lothian.

The percentage of the most common misspellings classified as phonetic errors was computed for each sample at each age. These percentages are compared in Table 119. At ages 7 and 11, a significantly higher proportion of the most common misspellings of the West Lothian than of the Jackson samples were classified as phonetic errors. The difference at age 14 is not significant. An age trend is evident, an additional demonstration of which may be obtained by further inspection of Tables 116, 117, and 118. At age 7, the most common misspelling was identical for both samples in 7 cases, or 29% of the time. At age 11, identical misspellings have increased to 16, or 32% of the total, and by age 14 there are 23 identical misspellings representing 46% of the cases. Time tends to resolve the differences between the samples.

TABLE 119

COMPARISON OF PERCENTAGES OF MOST COMMON MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES CLASSIFIED AS PHONETIC ERRORS

Age	Jackson		West Lothian		Difference	z
	No.	Percentage	No.	Percentage		
7	24	25.00	24	62.50	-37.50	2.61*
11	50	63.34	50	85.00	-21.66	2.48*
14	50	73.34	50	74.00	- 0.66	.07

COMPARISON OF READABILITY OF MISSPELLED WORDS

The next comparisons concern the readability of the misspellings of the samples. On the whole, phonetic misspellings should be easier to read than non-phonetic errors. Phonetic misspellings may look strange, but you can sound them out to produce the right word sound. Ichyou does not look like issue, but you come out with the right sound. The readability of misspellings, therefore, can be used as further evidence of the application of phonics to spelling.

The present comparisons were conducted in the following manner: A random sample of a misspelling of each word in the spelling list was first obtained for each sample at each age. In this way, tests were constructed which represented 24 Jackson and 24 West Lothian misspellings at age 7, and 50 misspellings for each sample at ages 11 and 14. In order to control practice effects, the words were alternated so that odd-numbered misspellings were from the Jackson samples and even-numbered misspellings were from the West Lothian samples. Moreover, the tests were constructed so that half of the West Lothian misspellings preceded the Jackson misspelling of the same word, and vice versa. Copies of the tests may be examined in Appendix B.

These tests were administered to three sections of undergraduate students in teacher education at The University of Michigan. Because these sections had not been grouped in any special manner and were sections of the same class, there is no reason to believe that they would differ in performance on the test. Copies of the tests were rotated in each class, so that each student responded to the misspellings of only one age group. Tests were administered by faculty members involved in the investigation, using a common set of instructions. Examinees were instructed to respond in writing to each misspelling in turn and not go back once a response had been made.

Table 120 reports the results of these tests. On all tests, the subjects responded correctly to a significantly larger number of West Lothian misspellings. The biggest difference occurs at age 11, a time when West Lothian children have been observed to be at a peak in spelling ability as compared with Jackson children. The difference at age 14 is smaller than at the other ages. Even in this case, however, the difference is still significantly in favor of the West Lothian sample, in contrast to the results of the comparisons of the most common misspellings. As one of the assistants who scored the spelling records remarked, "The Scottish kids seem to come closer when they're wrong."

TABLE 120

COMPARISON OF READABILITY OF MISSPELLINGS
OF JACKSON AND WEST LOTHIAN SAMPLES

Age	Jackson			West Lothian			Difference	df	t
	No.	Mean	s	No.	Mean	s			
7	38	5.05	1.62	38	9.00	1.76	-3.95	73	10.13**
11	37	29.70	2.22	37	38.19	2.16	-8.49	73	16.65**
14	39	36.77	2.40	39	39.95	2.06	-3.18	76	6.24**

Part 2

Leeds Comparisons with American Children

It has previously been explained that the results would be presented in two parts. The curtain has now fallen on the first part of the presentation. The action turns next to the Leeds comparisons with American children. The sources of comparable data on American children remain the same, except that different groups of Jackson and Pinellas children were used in the comparisons with the Leeds than with the West Lothian samples in order to suit the younger ages of the Leeds samples. Otherwise, the studies based on the Leeds and West Lothian data were identical. The results, therefore, lend themselves to the same outline.

Comparison of Mean Scores of Leeds Samples with Test Norms and with Mean Scores of Groups of American Children

PARAGRAPH MEANING

Comparison of Leeds samples with the test norms at the same ages as the samples. Table 121 compares the mean scores of the Leeds samples on the Stanford Paragraph Meaning Test with the American norms at the same ages. The sample means are above the norms at all ages, but only the difference at age 7 is significant. The superiority of the sample at this age was not maintained at the other ages, even though the mean IQ's of the samples at ages 11 and 14 were somewhat above normal. Note that the original sample is used at age 7 rather than the partial sample resulting from the matching with Pinellas children. This partial sample will be used only in the comparisons with its Pinellas counterpart. The original sample will be used in all other comparisons involving Leeds children.

TABLE 121

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	338	14.94	10.15	6.4	4.79	13.69**
11	382	28.83	28.68	8.9	.15	.33
14	362	30.78	30.10	7.0	.68	1.84

Comparison of Leeds samples with the test norms at 12 months above the mean ages of the sample. Table 122 compares the mean scores of the Leeds samples on the Stanford Paragraph Meaning Test with the American norms for children a year above the mean ages of the samples. The sample means now fall significantly below the norms at all ages. This comparison produces the largest change at age 7, where the sample mean was significantly above the norm when the comparison was made at the same age as the sample. Time favors children most at this age because it is a period of rapid growth in achievement. The addition of 12 months to the mean ages of the samples produces the largest change in the norm at this age on other tests as well.

TABLE 122

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS ON STANFORD PARAGRAPH MEANING TEST AT 12 MONTHS ABOVE THE MEAN AGES OF THE SAMPLES

Age	No.	Mean	Norm	sd	Difference	z
7	338	14.94	24.34	10.7	-9.40	16.21**
11	382	28.83	33.02	8.6	-4.19	9.52**
14	362	30.78	32.08	6.7	-1.30	3.71**

Comparison of Pinellas and Leeds samples. The mean scores of the Pinellas and Leeds samples on the Stanford Paragraph Meaning Test are compared in Table 123. A significant difference appears in favor of the Pinellas sample at age 14. The differences at the other ages are negligible. Even the difference at age 14, while statistically significant, is not large. It amounts to slightly more than a single test point, hardly

TABLE 123

COMPARISON OF PINELLAS AND LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Pinellas		Leeds		Difference	t
		Mean	s	Mean	s		
7	138	19.64	9.32	18.86	12.98	.78	.58
11	382	28.58	7.72	28.83	9.25	-.25	.41
14	362	32.14	6.49	30.78	7.24	1.36	2.65**

worth talking about from an educational standpoint.

Comparison of Pinellas samples with test norms. Table 124 shows how the mean scores of the Pinellas samples compared with the norms on the Stanford Paragraph Meaning Test. The sample means are significantly above the norms at ages 7 and 14. The sample mean falls slightly below the norm at age 11, but the difference is not significant. The mean paragraph meaning scores of the Leeds samples were also above the norms at ages 7 and 14, but only the difference at age 7 was significant. Although the original infant sample was used in the comparison with the test norm, it has been established that the partial sample employed in the comparison with Pinellas children maintains the same superiority over the norm as that shown by the total sample. At age 14, the mean score of the Pinellas sample is significantly above both the test norm and the mean score of the Leeds sample. While the mean IQ of the Pinellas sample at age 14 is above the norm, it is not quite as high as that of the equivalent Leeds sample. At age 11, neither the Pinellas nor Leeds sample differed significantly from the norm on the paragraph meaning test.

TABLE 124

COMPARISON OF PINELLAS SAMPLES WITH AMERICAN NORMS ON STANFORD PARAGRAPH MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	138	19.64	14.07	6.4	5.57	10.11**
11	382	28.58	28.68	8.9	-.10	.22
14	362	32.16	30.10	7.0	2.06	5.60**

WORD MEANING

Comparison of Leeds samples with the test norms at the same ages as the samples. The mean scores of the Leeds samples on the Stanford Word

Meaning Test are compared with the American norms at the same ages as the samples in Table 125. The sample means are significantly above the norms at all ages. The advantage at age 7 is not lost at the later ages as on

TABLE 125

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS
ON STANFORD WORD MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	338	13.42	9.39	5.7	4.03	13.00**
11	382	32.61	29.05	10.1	3.56	6.85**
14	362	33.98	28.46	8.5	5.52	12.27**

the paragraph meaning test. In fact, the sample means exceed the norms by the widest margin at age 14, although later results will show that the sample at age 11 was handicapped by an inadequate test ceiling. The strange part of it is that the samples at ages 11 and 14 did not demonstrate a similar superiority on the paragraph meaning test.

Comparison of Leeds samples with the test norms at 12 months above the mean ages of the samples. Table 126 studies the relationship between

TABLE 126

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS
ON STANFORD WORD MEANING TEST AT 12 MONTHS
ABOVE THE MEAN AGES OF THE SAMPLES

Age	No.	Mean	Norm	sd	Difference	z
7	338	13.42	20.70	8.2	-7.28	16.18**
11	382	32.61	35.03	9.7	-2.42	4.84**
14	362	33.98	32.20	8.0	1.78	4.24**

the mean scores of the Leeds samples on the Stanford Word Meaning Test and the American norms at 12 months above the mean ages of the samples. This comparison places the sample means significantly below the norms at ages 7 and 11. The sample mean at age 14 remains significantly above the norm. The addition of 12 months to the mean ages of the samples continues to change the complexion most at age 7. The smallest change occurs at age 14, where rate of growth has tapered off as measured by the test. Similar results were obtained when the mean paragraph meaning scores of the Leeds samples were compared with the norms at age, plus 12 months.

Comparison of Pinellas and Leeds samples. The mean scores of the Pinellas and Leeds samples on the Stanford Word Meaning Test are shown in relation to each other in Table 127. Significant differences appear in favor of the Leeds samples at ages 11 and 14, where the mean scores of the Leeds samples were significantly above both the test norms and the mean scores of the Pinellas samples. The difference at age 14 occurs notwithstanding the fact that the mean score of the Pinellas sample was also significantly above the test norm at this age. There is essentially no difference at age 7, where the mean scores of both samples were significantly above the test norm. The fact that the Leeds sample at age 7 is a partial sample in this case does not alter the picture. It has been

TABLE 127

COMPARISON OF PINELLAS AND LEEDS SAMPLES
ON STANFORD WORD MEANING TEST

Age	No.	Pinellas		Leeds		Difference	t
		Mean	s	Mean	s		
7	138	17.06	7.62	16.99	10.84	.07	.06
11	382	28.51	8.86	32.61	10.89	-4.10	5.70**
14	362	32.59	7.98	33.98	7.62	-1.39	2.39*

established that this partial sample maintains the same relationship to the norm as the total sample on both the paragraph and word meaning tests.

Comparison of Pinellas samples with test norms. The results reported in Table 128 compare the mean scores of the Pinellas samples with the American norms on the Stanford Word Meaning Test. The sample means are significantly above the norms at ages 7 and 14. The sample mean drops slightly below the norm at age 11, but the difference is not significant. The mean paragraph meaning scores of the Pinellas samples were also significantly above the test norms at ages 7 and 14, but below the norm by an insignificant margin at age 11. The implication is that the samples at ages 7 and 14 were superior to the sample at age 11. The fact of the matter is that the mean IQ's of the samples at both ages 11 and 14 were above the norm by small but statistically significant margins, while that of the sample at age 7 was not.

TABLE 128

COMPARISON OF PINELLAS SAMPLES WITH AMERICAN NORMS ON STANFORD WORD MEANING TEST

Age	No.	Mean	Norm	sd	Difference	z
7	138	17.06	12.70	5.7	4.36	8.99**
11	382	28.51	29.05	10.1	-.54	1.04
14	362	32.59	28.46	8.5	4.13	9.24**

SPELLING

Comparison of Leeds samples with the test norms at the same ages as the samples. Table 129 compares the mean scores of the Leeds samples on the Metropolitan Spelling Test with the American norms at the same ages. The sample means are significantly above the norms at all ages. The Leeds samples spell well as judged by the standards on this test, although the

TABLE 129

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS ON METROPOLITAN SPELLING TEST

Age	Sample			Norm	Difference	t
	No.	Mean	s			
7	337	12.72	6.93	1.70	11.02	29.23**
11	381	28.09	12.47	22.53	5.56	8.70**
14	362	28.66	11.78	26.39	2.27	3.67**

differences decrease with advance in age, an indication that the samples tend to lose their advantage with time. A similar age trend occurs on other tests.

Comparison of Leeds samples with the test norms at 12 months above the mean ages of the samples. The mean scores of the Leeds samples on the Metropolitan Spelling Test are compared with the American norms at 12 months above the mean ages of the samples in Table 130. The sample mean at age 7 remains significantly above the norm. The same cannot be said at ages 11 and 14, where the sample means now fall significantly below the norms. These results bear further witness to the effect of time on achievement.

TABLE 130

COMPARISON OF LEEDS SAMPLES WITH AMERICAN NORMS ON METROPOLITAN SPELLING TEST AT 12 MONTHS ABOVE THE MEAN AGES OF THE SAMPLES

Age	Sample			Norm	Difference	t
	No.	Mean	s			
7	337	12.72	6.93	10.39	2.33	6.16**
11	381	28.09	12.47	30.03	-1.94	3.04**
14	362	28.66	11.78	32.26	-3.60	5.82**

Comparison of Jackson and Leeds samples. In Table 131 are compared the mean scores of the Jackson and Leeds samples on the Metropolitan Spelling Test. The Leeds samples hold a significant advantage at all ages.

TABLE 131

COMPARISON OF JACKSON AND LEEDS SAMPLES
ON METROPOLITAN SPELLING TEST

Age	Jackson			Leeds			Difference	t
	No.	Mean	s	No.	Mean	s		
7	301	7.42	4.26	337	12.72	6.93	-5.30	11.78**
11	304	24.86	10.20	381	28.09	12.47	-3.23	3.73**
14	304	21.55	11.08	362	28.66	11.78	-7.11	8.02**

These results fail to replicate the age trend which was revealed when the mean scores of the Leeds samples were compared with the American norms on this test. In fact, the difference in favor of the Leeds sample swells at age 14.

Comparison of Jackson samples with test norms. Table 132 compares the Jackson samples with the American norms on the Metropolitan Spelling Test. The sample means are significantly above the norms at ages 7 and 11, but significantly below the norm at age 14. The Leeds samples also

TABLE 132

COMPARISON OF JACKSON SAMPLES WITH AMERICAN NORMS
ON METROPOLITAN SPELLING TEST

Age	Sample			Norm	Difference	t
	No.	Mean	s			
7	301	7.42	4.26	2.09	5.33	21.67**
11	304	24.86	10.20	23.22	1.64	2.80**
14	304	21.55	11.08	26.70	-5.15	8.11**

showed an age trend in relation to the norms on this test, but without actually dropping below the norms at any time. The large differences in favor of both the Jackson and Leeds samples at age 7 are attributable to a deficiency in the norm at that age. At the primary level, therefore, the comparison of the Jackson and Leeds samples probably yields a better assessment of the spelling achievement of Leeds children in relation to American children than does the comparison of the Leeds samples with the test norms. It has previously been demonstrated that the norms at the other ages on the spelling test are probably fairly adequate.

HANDWRITING

Comparison of Jackson and Leeds samples. Table 133 compares the quality of handwriting of Jackson and Leeds children. These results are based on a random sample of 50 boys and 50 girls from the complete samples at each age in each country. The samples were reduced to these numbers because of the diligence required to obtain reliable ratings of handwriting. To turn to the table. The Leeds sample holds a significant advantage at age 7. Differences at the other ages are not significant. A comparison cannot be made with the norms in this case, since the Metropolitan Handwriting Scale does not calibrate performance by age or grade, but is simply a set of standards for rating handwriting on a scale from

TABLE 133

COMPARISON OF JACKSON AND LEEDS SAMPLES
ON METROPOLITAN HANDWRITING SCALE

Age	No.	Jackson		Leeds		Difference	t
		Mean	s	Mean	s		
7	100	37.30	8.37	43.45	11.84	-6.15	4.24**
11	100	54.25	6.68	53.70	4.64	.55	.68
14	100	56.10	7.03	54.80	6.31	1.30	1.38

20 to 80. Exhibit 10 illustrates the difference between the mean rating at age 7, where a significant difference was found in favor of the Leeds sample.

ORAL READING

Comparison of Leeds sample with the test norm at the same age as the sample. Gray's Oral Reading Test was administered to a systematic sample of 50 children from the complete sample at age 7 in Leeds. One record was accidentally erased from the tape. Table 134 compares the mean score of the remaining 49 cases with the test norm at the same age as the sample. The sample mean is significantly above the norm. The difference, which amounts to .8 of a grade, can probably be related to the head start which Leeds children get by beginning their primary education at age 5 rather than 6. The same initial acceleration has been observed on other tests.

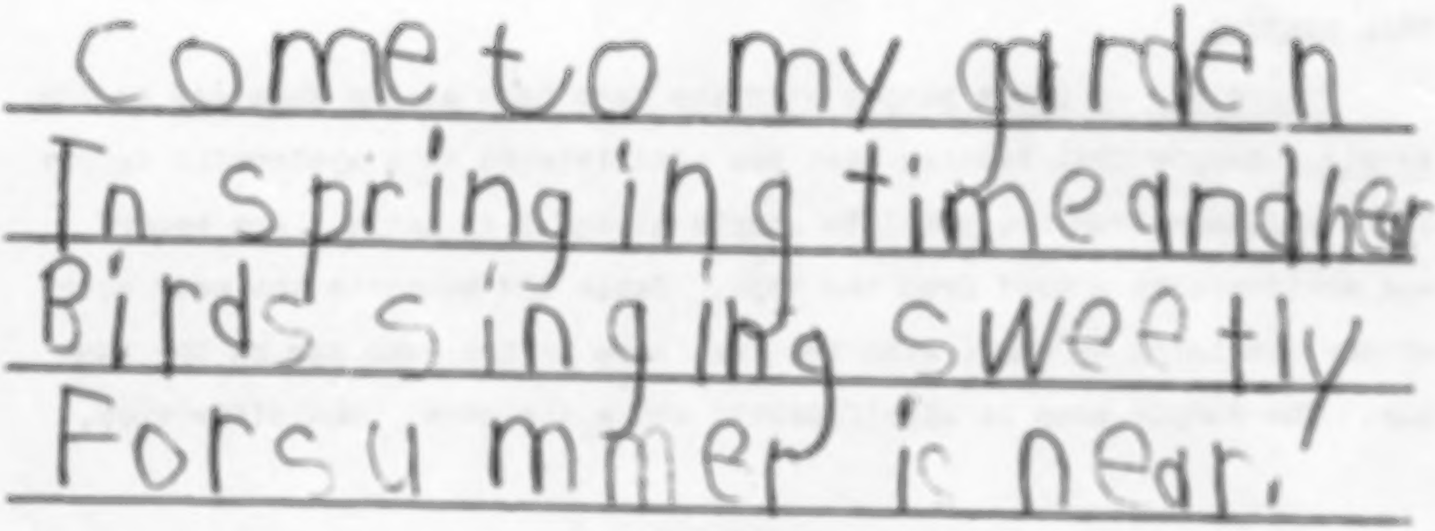
TABLE 134

COMPARISON OF LEEDS SAMPLE AT AGE 7 WITH AMERICAN NORM ON GRAY'S ORAL READING TEST

Sample			Norm	Difference	t
No.	Mean	s			
49	9.2	9.7	4.5	4.7	3.38**

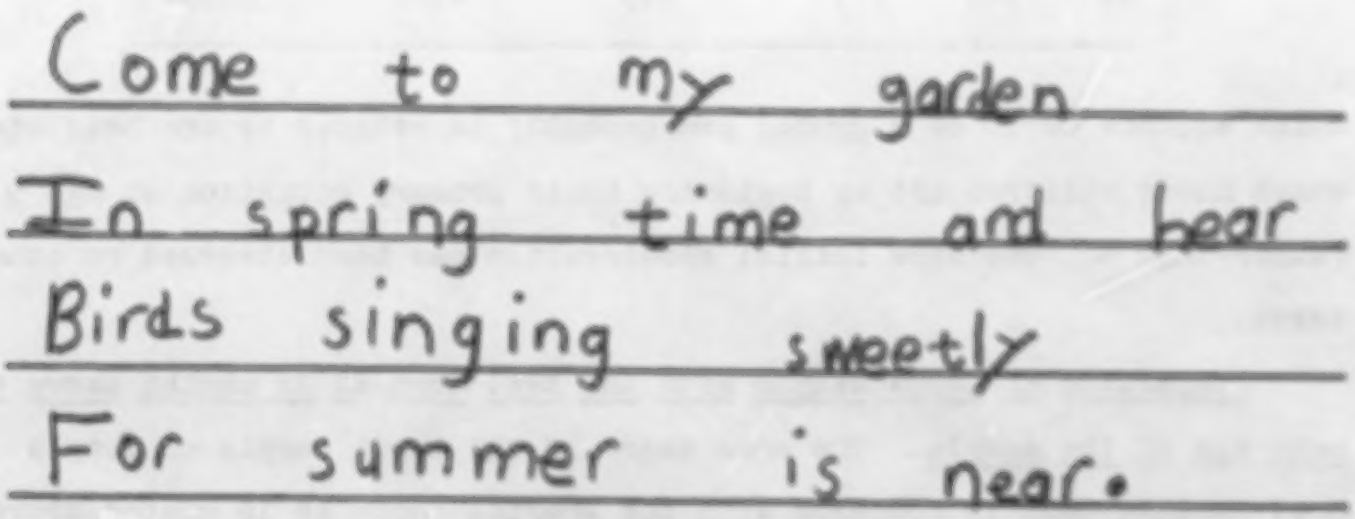
Comparison of Leeds sample with the test norm at 12 months above the mean age of the sample. The mean score of the Leeds sample on Gray's Oral Reading Test is compared with the American norm at 12 months above the mean age of the sample in Table 135. This comparison drops the sample mean below the norm, but the difference is not significant. The sample holds its own rather well, considering the nature of the comparison.

Jackson



Come to my garden
In spring ing time and hear
Birds sing ing sweetly
For summer is near.

Leeds



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 10. Representative examples of handwriting of Jackson and Leeds samples at age 7.

TABLE 135

COMPARISON OF LEEDS SAMPLE AT AGE 7 WITH AMERICAN NORM ON GRAY'S ORAL READING TEST AT 12 MONTHS ABOVE THE MEAN AGE OF THE SAMPLE

Sample			Norm	Difference	t
No.	Mean	s			
49	9.2	9.7	10.5	-1.3	1.07

Comparison of Jackson and Leeds samples. In Table 136 are compared the mean scores of the Jackson and Leeds samples on Gray's Oral Reading Test. The Jackson sample was reduced to 49 cases by the exclusion of a repeater of the male sex. He was the only repeater in the group and his age was out of line with the rest of the sample. He was dropped for that reason. Both samples, therefore, were reduced to the same number, since the Leeds sample was also depleted by one case because of a spoiled record. The comparison of these samples in Table 136 shows a significant difference in favor of the Leeds sample, amounting to roughly a grade. These results, too, appear to be related to the difference in the amount of schooling the children have had.

TABLE 136

COMPARISON OF JACKSON AND LEEDS SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

No.	Jackson		Leeds		Difference	df	t
	Mean	s	Mean	s			
49	3.41	5.49	9.18	9.72	-5.77	77	3.61**

Comparison of Jackson sample with the test norm. Table 137 compares the mean score of the Jackson sample on Gray's Oral Reading Test with the American norm at the same age. A significant difference was not found. The norms apparently do justice to Jackson children at this age.

TABLE 137

COMPARISON OF JACKSON SAMPLE AT AGE 7 WITH AMERICAN NORM ON GRAY'S ORAL READING TEST

Sample			Norm	Difference	df	t
No.	Mean	s				
49	3.4	5.5	4.0	-.6	48	.77

Comparison of Variances of Leeds Samples and Groups of American Children on Achievement Tests

PARAGRAPH MEANING

Table 138 shows that on the Stanford Paragraph Meaning Test the Leeds samples were more variable than the Pinellas samples at all ages, but only the differences at ages 7 and 11 are significant. Table 139 reveals that the Leeds sample at age 11 was also significantly more variable in intelligence. The variances in intelligence cannot be compared at age 7, since mental test data were not available on the Leeds infant sample. Significant differences were not found between the mean scores of the samples at ages 7 and 11 on the paragraph meaning test, demonstrating that significant differences may be found between variances, where differences between mean scores are not significant. This combination of events calls

TABLE 138

COMPARISON OF VARIANCES OF PINELLAS AND LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Pinellas		Leeds		df	F
	No.	Variance	No.	Variance		
7	138	86.79	138	168.49	137/137	.515**
11	382	59.65	382	85.62	381/381	.697*
14	362	42.13	362	52.35	361/361	.805

TABLE 139

COMPARISON OF VARIANCES OF PINELLAS AND LEEDS SAMPLES IN INTELLIGENCE AT AGE 11

Pinellas		Leeds		df	F
No.	Variance	No.	Variance		
382	139.04	370	238.80	381/369	.582**

attention to the possibility that one educational system *may* promote greater variability than another, without producing important differences between mean performance. This is reason enough to include a comparison of variances, apart from the outcome of the comparison of means.

Table 140 compares the distributions of the samples at each age on

TABLE 140

DISTRIBUTION OF SCORES OF PINELLAS AND LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Pinellas	Leeds	Pinellas	Leeds	Pinellas	Leeds
45-48	1	2	1	9		
42-44	3	3	11	24	11	10
39-41	4	4	28	27	47	35
36-38	3	11	34	42	74	55
33-35	4	3	64	44	60	70
30-32	6	15	51	41	62	54
27-29	7	8	36	45	43	43
24-26	14	7	58	37	23	37
21-23	13	5	32	34	22	20
18-20	19	8	33	30	8	18
15-17	16	8	19	23	6	10
12-14	22	9	10	13	4	8
9-11	18	20	5	5	2	
6- 8	5	12		5		2
3- 5	2	9		3		
0- 2	1	14				
Totals	138	138	382	382	362	362

the paragraph meaning test. The greater variability of the Leeds sample at age 7 stems from the bi-modal nature of the distribution. The Pinellas sample at this age presents a more normal distribution. At age 11, the Leeds sample covers a wider range than the Pinellas sample, with less concentration of scores in any interval. A significant difference between mean scores was found only at age 14, where the Pinellas sample held a small advantage, but you could never tell it from the distributions. The individual variation remains large within each group at all ages. The resulting overlap between distributions tends to over-shadow all other considerations.

WORD MEANING

Table 141 compares the variances of the Pinellas and Leeds samples on the Stanford Word Meaning Test. These results parallel those obtained from the same comparison on the paragraph meaning test. The Leeds samples are again significantly more variable at ages 7 and 11, while a significant difference was not found at age 14 on either test. Attention has previously been called to the fact that the Leeds sample at age 11 was also significantly more variable in intelligence than the Pinellas sample. This information was reported in Table 139.

TABLE 141

COMPARISON OF VARIANCES OF PINELLAS AND LEEDS SAMPLES ON STANFORD WORD MEANING TEST

Age	Pinellas		Leeds		df	F
	No.	Variance	No.	Variance		
7	138	58.06	138	117.42	137/137	.494**
11	382	78.46	382	118.51	381/381	.662*
14	362	63.69	362	58.02	361/361	1.10

The distributions of the samples on the word meaning test are revealed in Table 142. The overlap of the distributions at each age is evident at a glance. The greater variability of the Leeds sample at age 7 arises not from a difference between the range of scores, but from a difference between the form of the distributions. At age 11, the Leeds sample was significantly more variable, notwithstanding an inadequate test ceiling. It is apparent that a higher test ceiling would have increased the vari-

TABLE 142

DISTRIBUTION OF SCORES OF PINELLAS AND LEEDS
SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Pinellas	Leeds	Pinellas	Leeds	Pinellas	Leeds
45-48			9	45	4	8
42-44			20	54	42	39
39-41			30	50	49	69
36-38	4	3	32	37	62	76
33-35	3	7	44	36	47	44
30-32	5	12	48	32	44	39
27-29	3	17	36	19	34	28
24-26	8	8	45	19	27	18
21-23	15	10	40	20	19	11
18-20	18	10	33	19	15	14
15-17	28	7	23	21	12	10
12-14	20	10	11	16	4	3
9-11	16	16	6	7	1	1
6- 8	15	11	5	6	1	2
3- 5	2	15		1	1	
0- 2	1	12				
Totals	138	138	382	382	362	362

ability of the Leeds sample at this age, as well as the mean score of this sample, which was already significantly above that of the corresponding Pinellas sample. A significant difference between mean scores was also found in favor of the Leeds sample at age 14, where the test ceiling was less of a factor.

SPELLING

Table 143 shows that on the Metropolitan Spelling Test the Leeds samples were more variable than the Jackson samples at all ages. Differences attain significance at ages 7 and 11, but not at age 14. These are similar to the results of the same comparisons on the paragraph and word meaning tests. A comparison of the variances of these samples in intelligence is possible only at age 11, where the Leeds sample was slightly more variable than the Jackson sample, but Table 144 shows that

TABLE 143

COMPARISON OF VARIANCES OF JACKSON AND LEEDS
SAMPLES ON METROPOLITAN SPELLING TEST

Age	Jackson		Leeds		df	F
	No.	Variance	No.	Variance		
7	301	18.14	337	48.04	300/336	.378**
11	304	104.00	381	155.50	303/380	.669**
14	304	122.84	362	138.77	303/361	.885

TABLE 144

COMPARISON OF VARIANCES OF JACKSON AND LEEDS
SAMPLES IN INTELLIGENCE AT AGE 11

Jackson		Leeds		df	F
No.	Variance	No.	Variance		
290	208.75	370	238.80	289/369	.874

the difference was not significant.

Table 145 distributes the scores of the samples on the spelling test. The greater variability of the Leeds samples springs mainly from the higher number of scores in the top intervals. This condition is especially apparent at age 7, where 66 cases in the Leeds sample exceed the highest score achieved by any Jackson child. The Jackson samples are outnumbered among the better spellers at the other ages as well. The Leeds samples

TABLE 145

DISTRIBUTION OF SCORES OF JACKSON AND LEEDS SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Jackson	Leeds	Jackson	Leeds	Jackson	Leeds
48-50			1	9	4	7
45-47			5	23	7	22
42-44			12	25	5	17
39-41			16	40	7	37
36-38			17	40	9	32
33-35			19	21	17	34
30-32			27	29	22	37
27-29			33	27	25	35
24-26		9	40	31	33	28
21-23		57	32	28	38	26
18-20	6	42	31	23	28	23
15-17	13	32	18	18	23	20
12-14	33	35	22	22	20	7
9-11	64	50	15	18	24	10
6- 8	76	52	8	13	20	10
3- 5	68	39	5	6	12	6
0- 2	41	21	3	8	10	11
Totals	301	337	304	381	304	362

served notice of their ability to spell when the mean scores of the present groups were compared on the spelling test. The differences were significantly in favor of the Leeds samples at all ages. However, some Leeds children spell better than others, just as some Jackson children do. The Leeds samples do not win all the laurels. The individual variation is much too large for that. In fact, the distributions at ages 11 and 14 cover the same range. This is still another demonstration of the fact that the overlap of the distributions may be large, even where differences between mean scores are statistically significant. The educational significance of the differences on the average must be judged accordingly.

HANDWRITING

The variances of the Jackson and Leeds samples included in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 146. A consistent pattern of differences does not appear. The Leeds sample is significantly more variable at age 7, while the Jackson samples are more variable at ages 11 and 14, although the greater variability of the Jackson samples at these ages was significant only at age 11 (cf. Table 144).

TABLE 146

COMPARISON OF VARIANCES OF JACKSON AND LEEDS SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Jackson		Leeds		df	F
	No.	Variance	No.	Variance		
7	100	70.10	100	140.25	99/99	.500**
11	100	44.63	100	21.53	99/99	2.07*
14	100	49.48	100	39.86	99/99	1.24

The distributions of the samples on the handwriting scale are presented in Table 147. The greater variability of the Leeds sample at age

TABLE 147

DISTRIBUTION OF RATINGS OF JACKSON AND LEEDS SAMPLES ON METROPOLITAN HANDWRITING SCALE

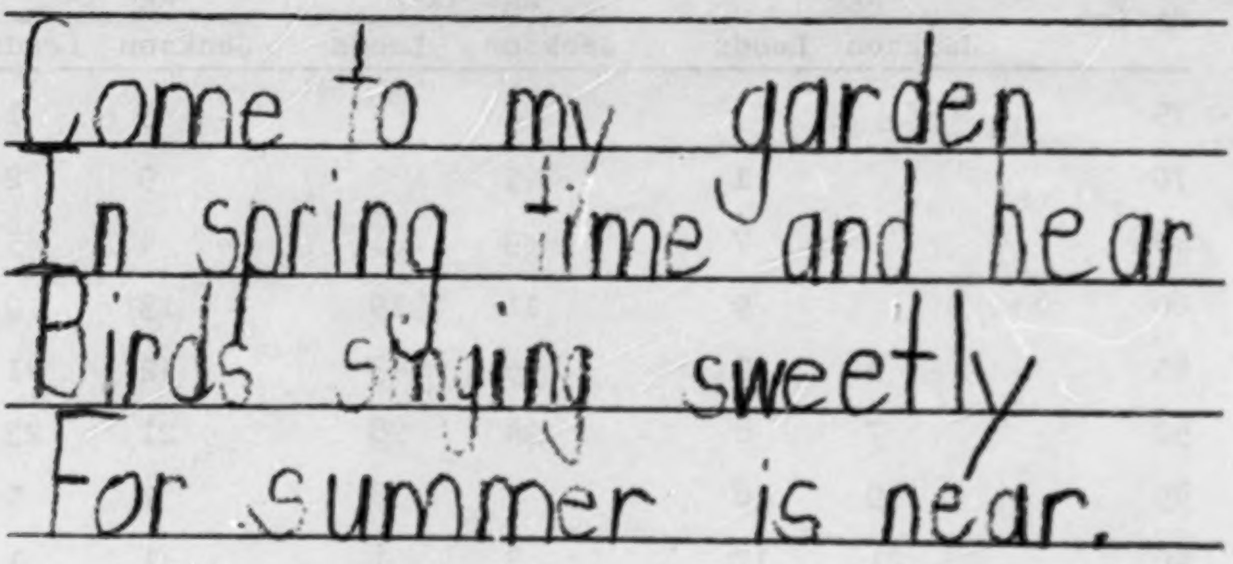
Rating	Age 7		Age 11		Age 14	
	Jackson	Leeds	Jackson	Leeds	Jackson	Leeds
75			1		3	1
70		1	5		9	2
65		7	3	1	4	5
60		9	11	19	13	20
55	3	7	45	43	42	41
50	7	8	24	28	21	23
45	19	16	7	8	7	5
40	21	17	3	1	1	1
35	22	17	1			2
30	14	13				
25	10	3				
20	4	1				
15		1				
Totals	100	100	100	100	100	100

7 is plainly visible. While giving this more variable performance in handwriting, the Leeds sample at this age also had a significantly higher mean rating. The differences between the mean ratings at ages 11 and 14 were not significant. The distributions at these ages also approach each other more closely. This is especially true at age 14. Exhibits 11 and 12 illustrate the extremes of the distributions at age 7, where the largest difference between the variances of the samples on the handwriting scale was found. Quite a study in individual differences.

ORAL READING

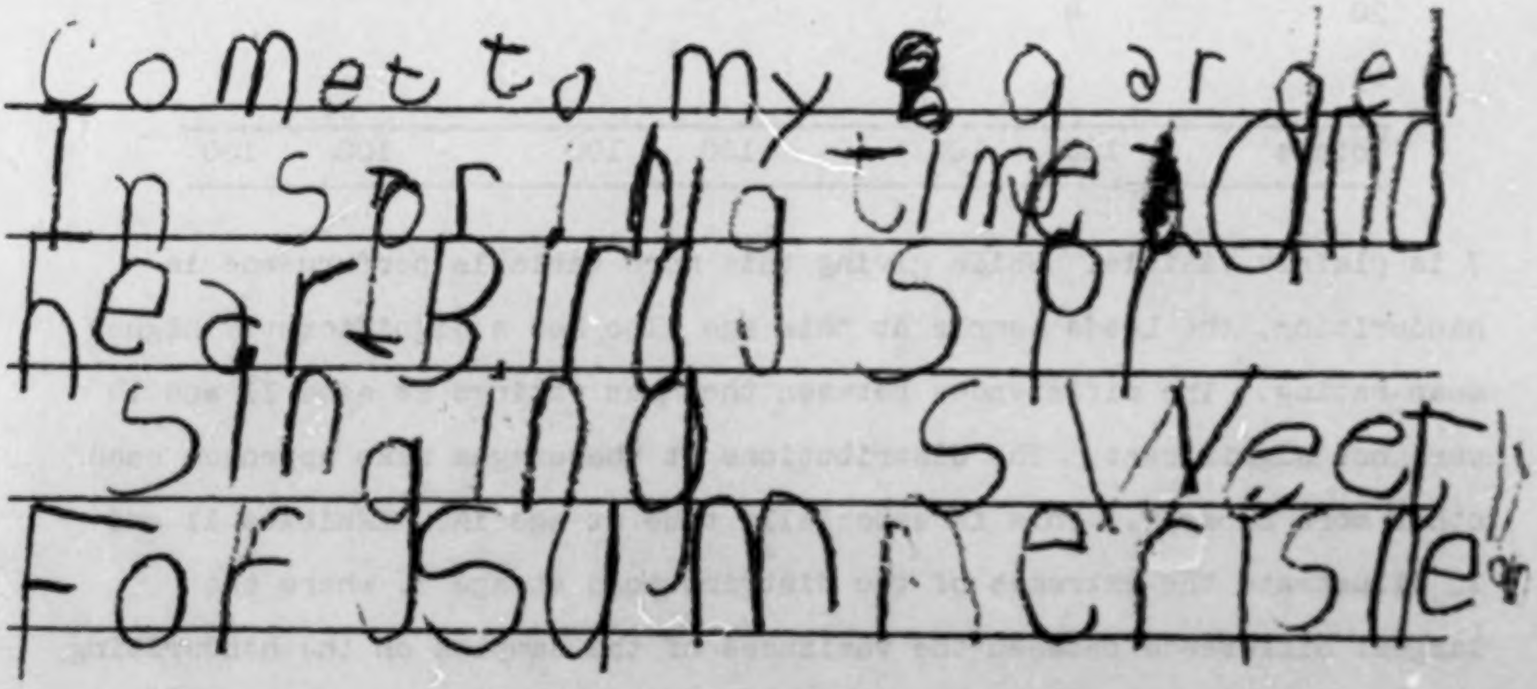
Table 148 compares the variances of the Jackson and Leeds samples

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

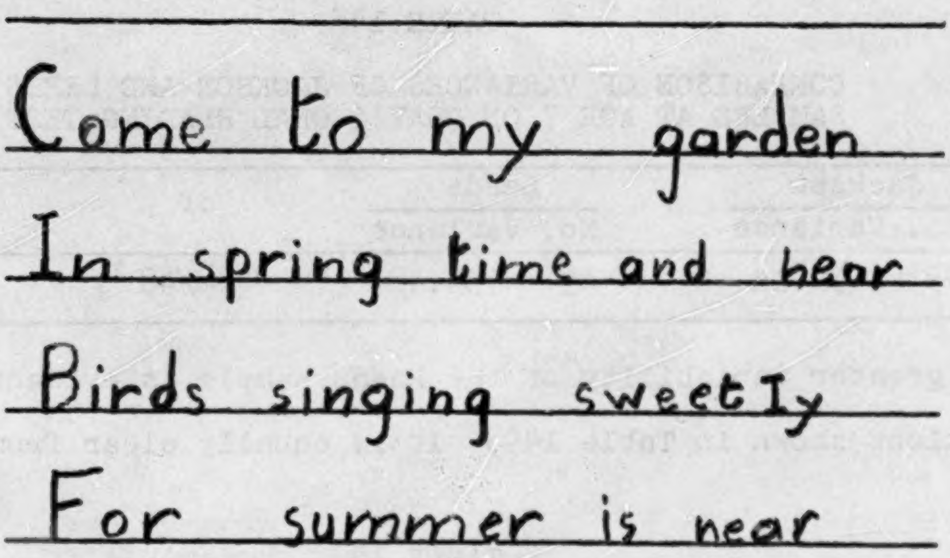
Lowest Rated



Comet to my garde
In spring time and
hear Birds spr
singing sweetl
For Jsummer is ne

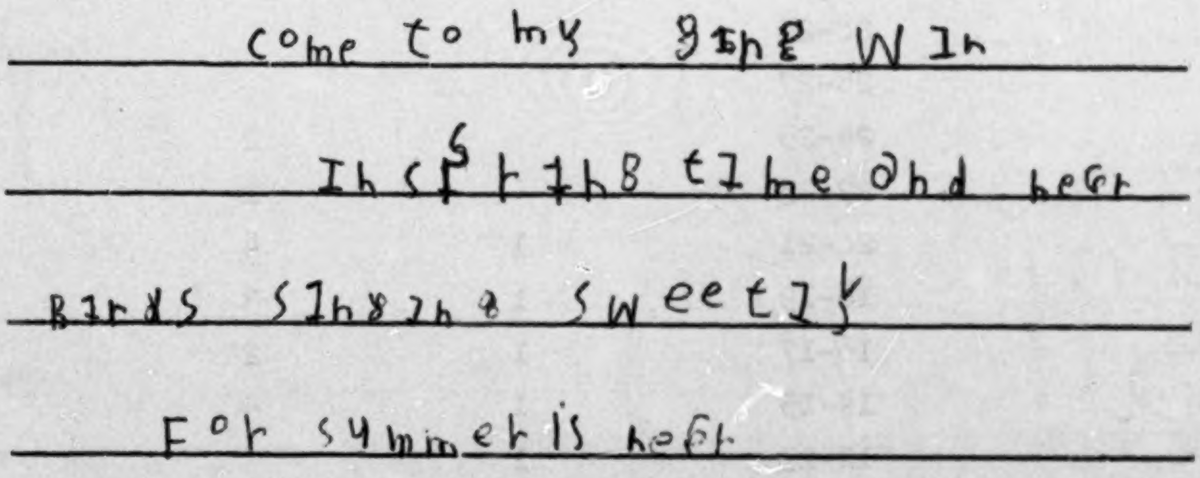
Exhibit 11. Contrast between highest and lowest rated products of handwriting in Jackson sample at age 7.

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near

Lowest Rated



come to my gIhg WIn
Ihsrthg tIme ahd hegr
BIrds sIngIng sWeetIy
For summer is hegr

Exhibit 12. Contrast between highest and lowest rated products of handwriting in Leeds sample at age 7.

used in the study of oral reading on Gray's Oral Reading Test. The Leeds sample is significantly more variable, just as on all other tests at this age.

TABLE 148

COMPARISON OF VARIANCES OF JACKSON AND LEEDS SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Jackson		Leeds		df	F
No.	Variance	No.	Variance		
49	30.14	49	94.48	48/48	.319**

The greater variability of the Leeds sample is evident from the distributions shown in Table 149. It is equally clear from the frequency

TABLE 149

DISTRIBUTION OF SCORES OF JACKSON AND LEEDS SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Jackson	Leeds
42-43		1
.		
.		
28-29		
26-27		
24-25		2
22-23		2
20-21	1	4
18-19	1	3
16-17	1	2
14-15	1	4
12-13	1	
10-11	2	2
8- 9	4	2
6- 7	1	5
4- 5	3	2
2- 3	3	3
0- 1	31	17
Totals	49	49

of scores in the lowest interval that the test was too difficult for many of the subjects in both samples. The younger ages of these subjects constitute a contributing factor here. The Jackson sample had the greater difficulty getting "off the ground" on this test. Even so, the Jackson sample managed to perform close to the test norm. The Leeds sample excelled both the Jackson mean and the norm by significant margins.

Comparison of Mean Scores of Boys and Girls

LEEDS SAMPLES

Paragraph meaning. Table 150 compares the mean scores of the boys and girls in the Leeds samples on the Stanford Paragraph Meaning Test.

TABLE 150

COMPARISON OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	158	13.38	10.76	180	16.31	12.29	-2.93	2.34*
11	185	28.46	9.72	197	29.17	8.80	-0.71	.79
14	199	30.78	7.49	163	30.78	6.94	.00	.00

The girls obtained higher mean scores than the boys at ages 7 and 11. The difference is significant at age 7, but not at age 11. No difference occurs at age 14, where the mean scores of the boys and girls are identical. This is not an error, but a coincidence.

Word meaning. The mean scores of the boys and girls in the Leeds samples on the Stanford Word Meaning Test are compared in Table 151. The girls hold the advantage at ages 7 and 11 on this test as well. However, neither of these differences is significant, although the difference is somewhat larger at age 7 than at age 11. The difference favors the

TABLE 151

COMPARISON OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	158	12.53	10.13	180	14.21	10.68	-1.68	1.49
11	185	32.13	11.77	197	33.06	10.00	-0.93	.83
14	199	34.12	8.02	163	33.81	7.12	.31	.39

boys at age 14, but not by a significant margin.

Spelling. Table 152 reports the comparison of the boys and girls in the Leeds samples on the Metropolitan Spelling Test. These results place the girls above the boys at all ages. Differences are significant at

TABLE 152

COMPARISON OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	158	12.03	6.77	179	13.33	7.03	-1.30	1.72
11	185	24.83	12.63	196	31.17	11.53	-6.34	5.11**
14	199	26.72	12.08	163	31.03	10.98	-4.31	3.55**

ages 11 and 14, but not at age 7. Time seems to engender a larger difference in favor of the girls. The opposite was true on the paragraph and word meaning tests, where the girls held their largest advantage at age 7 only to lose it at the later ages.

Handwriting. The mean ratings of the boys and girls in the Leeds samples used in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 153. The girls enjoy the advantage at all ages, although only the difference at age 14 is significant. The size of the

TABLE 153

COMPARISON OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	50	42.00	11.56	50	44.90	12.06	-2.90	1.23
11	50	52.80	4.54	50	54.60	4.61	-1.80	1.97
14	50	52.00	5.62	50	57.60	5.73	-5.60	4.93**

difference at this age may be related to a failure of the mean rating of the boys to increase from age 11 to 14. The mean rating of the girls increased with each advance in age. Exhibit 13 illustrates the difference between the mean ratings at age 14, where a significant difference was found in favor of the girls.

Oral reading. The mean scores of the boys and girls in the Leeds sample at age 7 who received Gray's Oral Reading Test are compared on this test in Table 154. The difference favors the girls, but the advantage is not significant.

TABLE 154

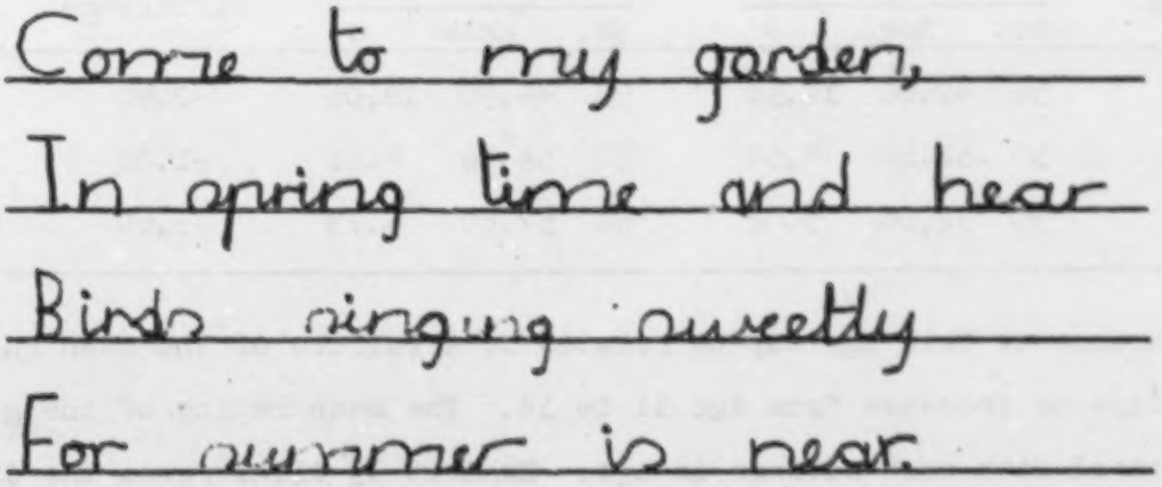
COMPARISON OF BOYS AND GIRLS IN LEEDS SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
24	8.38	10.21	25	9.96	9.37	-1.58	49	.56

PINELLAS SAMPLES

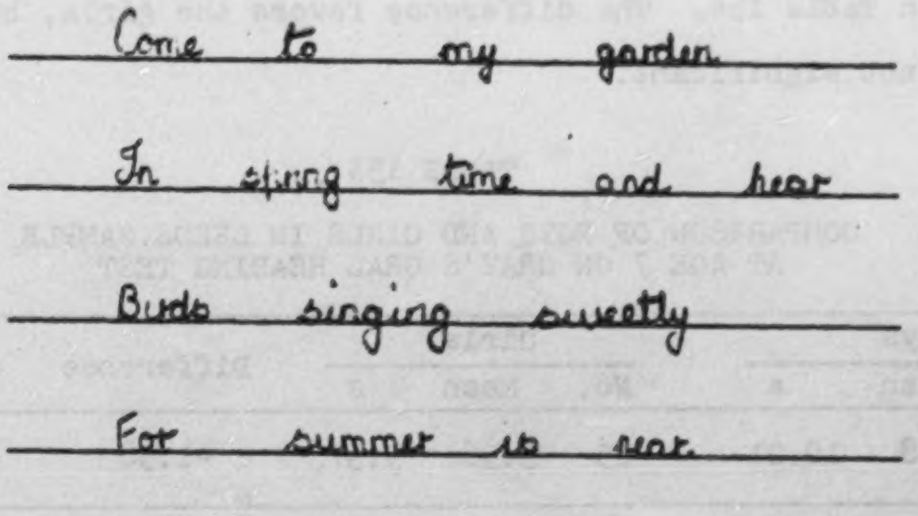
Paragraph meaning. Table 155 turns attention to the comparison of the boys and girls in the Pinellas samples on the Stanford Paragraph Meaning Test. At age 7, the mean score of the girls is significantly above that of the boys. Differences at the other ages are not significant.

Boys



Come to my garden,
In spring time and hear
Birds singing sweetly
For summer is near.

Girls



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 13. Representative examples of handwriting of boys and girls in Leeds sample at age 14.

TABLE 155

COMPARISON OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	63	17.40	8.56	75	21.53	9.56	-4.13	2.68**
11	185	28.79	8.29	197	28.38	7.17	.41	.52
14	199	32.12	6.78	163	32.15	6.14	-0.03	.05

Similar results were obtained from the comparison of the boys and girls in the Leeds samples on this test.

Word meaning. Table 156 shows that no significant differences were found between the mean scores of the boys and girls in the Pinellas samples on the Stanford Word Meaning Test. The outcome of the same comparison of the boys and girls in the Leeds samples was similar. In fact, the comparisons of the boys and girls in the Leeds and Pinellas samples leave little choice on either the paragraph or word meaning tests. The outcome was similar on each test in both sets of comparisons.

TABLE 156

COMPARISON OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	63	16.29	7.53	75	17.71	7.68	-1.42	1.09
11	185	28.46	9.33	197	28.56	8.41	-0.10	.10
14	199	32.27	8.55	163	32.99	7.21	-0.72	.87

JACKSON SAMPLES

Spelling. Table 157 compares the mean scores of the boys and girls in the Jackson samples on the Metropolitan Spelling Test. These results speak for themselves. It is clear by now that girls tend to excel boys in spelling achievement at all ages in all national samples, with some evidence that the differences increase with age, especially in the case of Jackson children.

TABLE 157

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	149	6.80	4.53	152	8.03	3.89	-1.23	2.53*
11	150	22.87	10.35	154	26.79	9.70	-3.92	3.41**
14	142	17.75	10.63	162	24.87	10.41	-7.12	5.89**

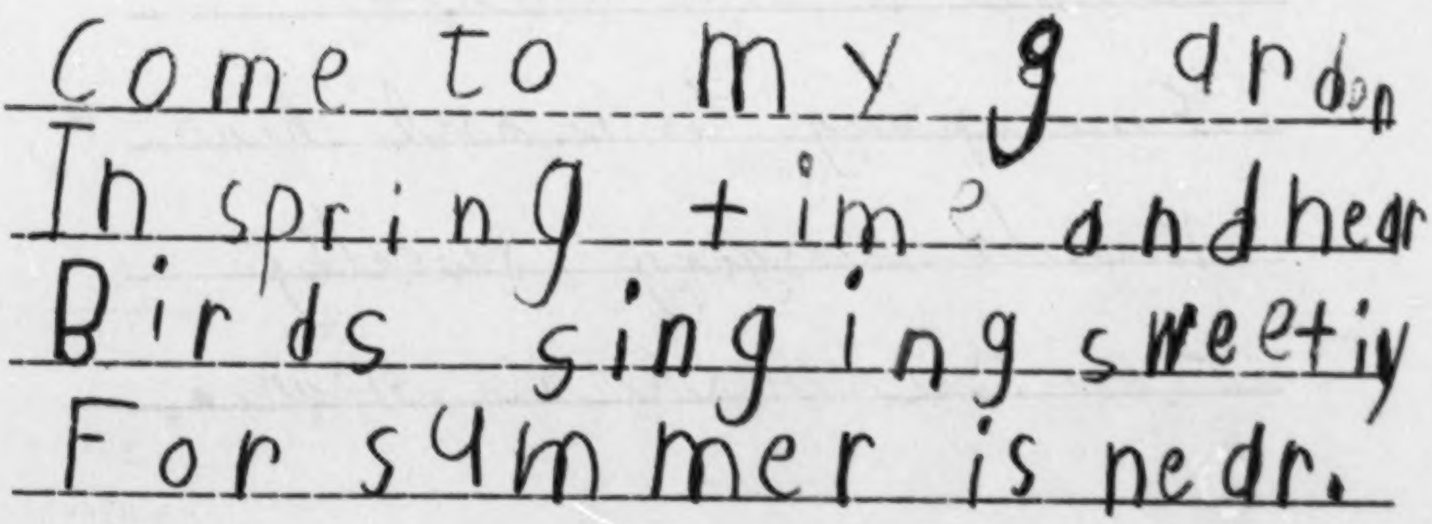
Handwriting. The mean ratings of the boys and girls in the Jackson samples whose handwriting was studied are compared on the Metropolitan Handwriting Scale in Table 158. The mean ratings of the girls exceed those of the boys at all ages. Differences are significant at ages 7 and 14, but not at age 11, where a variation in samples may have occurred. Exhibits 14 and 15 illustrate the differences between the mean ratings at

TABLE 158

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN HANDWRITING SCALE

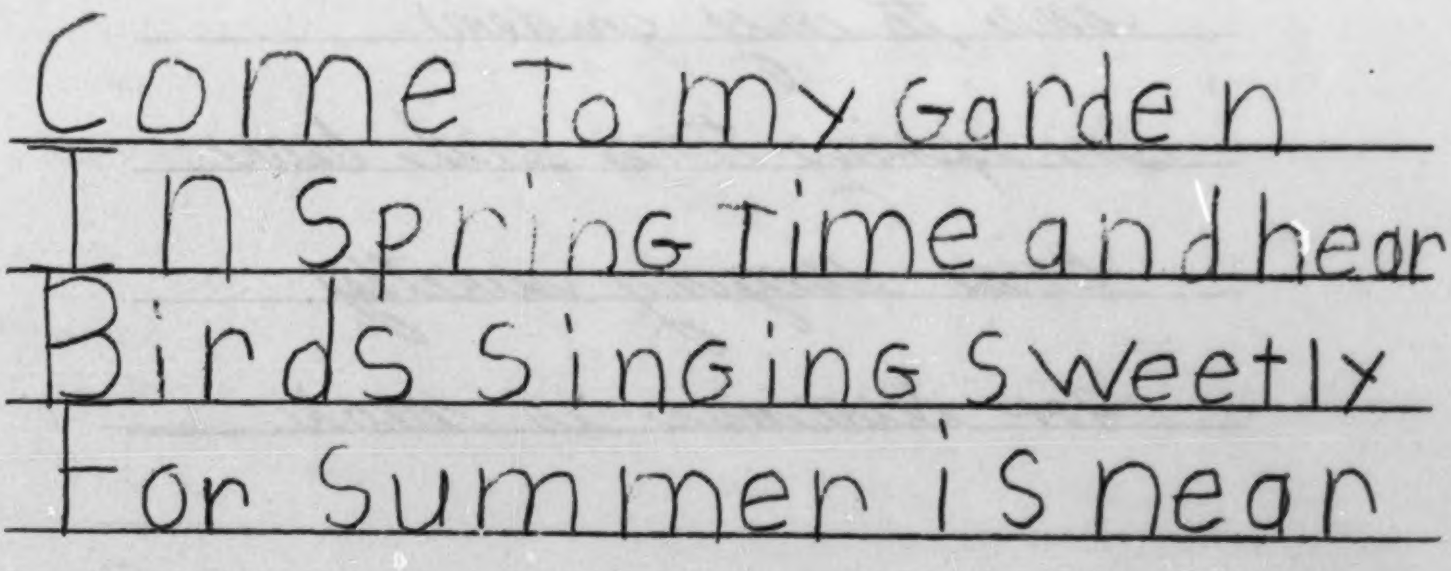
Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	50	33.80	8.05	50	40.80	7.20	-7.00	4.59**
11	50	53.50	5.56	50	55.00	7.63	-1.50	1.12
14	50	52.00	4.29	50	60.20	7.42	-8.20	6.77**

Boys



Come to my g ardon
In spring time andhear
Birds singing sweetiy
For summer is near.

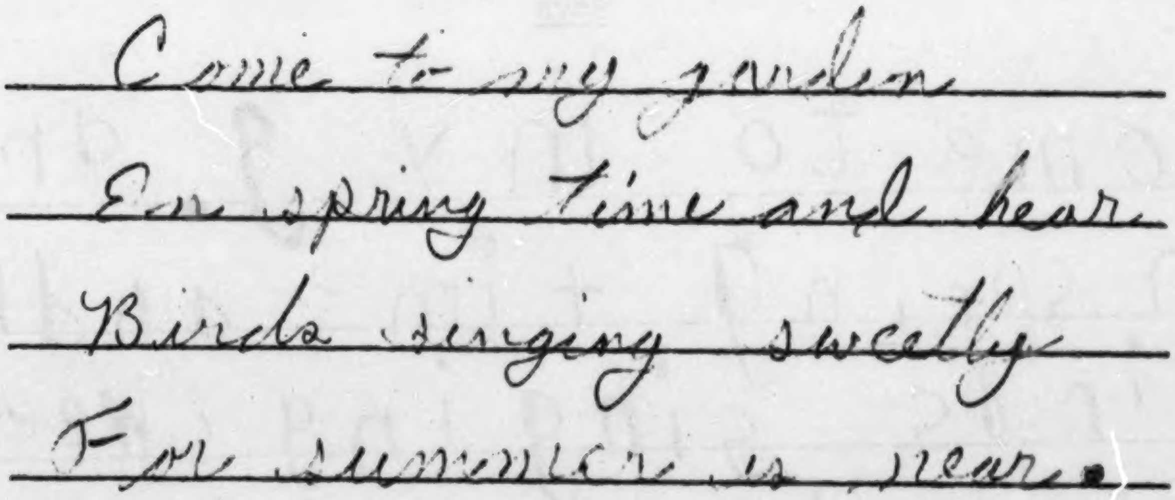
Girls



Come To my Garden
In SpringTime andhear
Birds SinGinG Sweetly
For Summer iS near

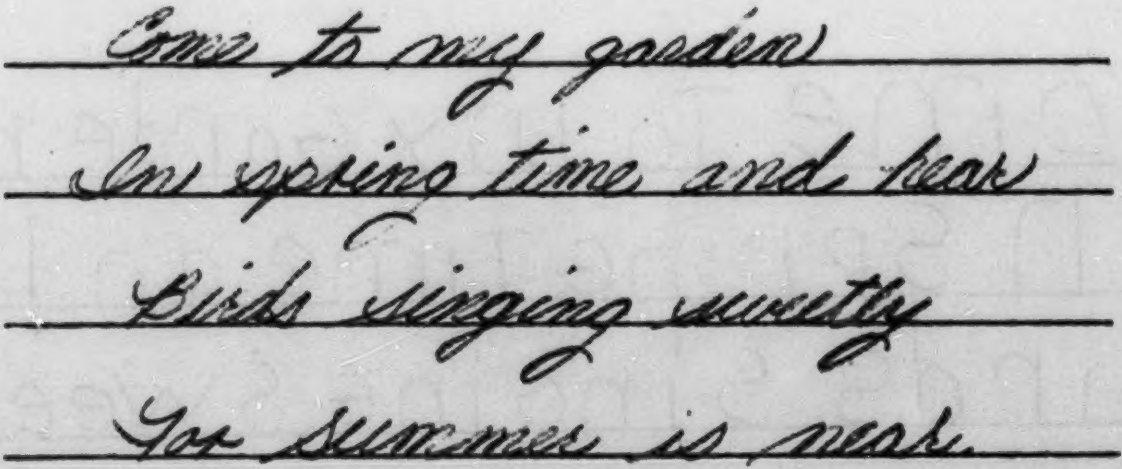
Exhibit 14. Representative examples of handwriting of boys and girls in Jackson sample at age 7.

Boys



Come to my garden
In spring time and hear.
Birds singing sweetly
For summer is near.

Girls



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 15. Representative examples of handwriting of boys and girls in Jackson sample at age 14.

ages 7 and 14, where the differences were significant.

Oral reading. Table 159 shows that a significant difference was not found between the mean scores of the boys and girls in the Jackson sample at age 7 who participated in the test of oral reading. Similar results were obtained when the mean scores of the boys and girls in the Leeds counterpart of the Jackson sample were compared on Gray's Oral Reading Test.

TABLE 159

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys			Girls			Difference	df	t
No.	Mean	s	No.	Mean	s			
26	3.19	4.85	23	3.65	6.25	-.46	43	.28

Comparison of Variances of Boys and Girls

LEEDS SAMPLES

Paragraph meaning. Table 160 compares the variances of the boys and girls in the Leeds samples on the Stanford Paragraph Meaning Test. The

TABLE 160

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	158	115.67	180	151.12	157/179	.765
11	185	94.46	197	77.49	184/196	1.22
14	199	56.09	163	48.11	198/162	1.17

girls are more variable than the boys at age 7, but the reverse relationship occurs at ages 11 and 14. However, none of the differences is significant.

The distributions of the boys and girls in the Leeds samples on this test may be inspected in Table 161. The distributions at each age are very similar. A significant difference between mean scores was found on this test only at age 7, where the girls held the advantage. The test at this age tended to be difficult as indicated by the number of low scores

TABLE 161

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48	1	1	4	5		
42-44	1	4	14	10	9	1
39-41	2	4	14	13	16	19
36-38	3	11	16	26	30	25
33-35	3	3	22	22	44	26
30-32	10	13	19	22	26	28
27-29	4	9	18	27	20	23
24-26	5	10	17	20	18	19
21-23	5	5	15	19	13	7
18-20	10	9	18	12	10	8
15-17	13	9	16	7	7	3
12-14	14	17	5	8	5	3
9-11	28	26	3	2		
6- 8	16	22	2	3	1	1
3- 5	21	18	2	1		
0- 2	22	19				
Totals	158	180	185	197	199	163

in both distributions. The girls survived the test somewhat better than the boys, but the advantage of the girls was small, even though statistically significant. The results shown in this table illustrate a condition which crops up repeatedly when scores of boys and girls are compared on achievement tests. Differences may occur on the average, but the variation within groups is likely to be overwhelmingly larger. The overlap which results tends to bury the differences between averages.

Word meaning. The variances of the boys and girls in the Leeds samples on the Stanford Word Meaning Test are compared in Table 162. The girls are more variable at age 7, while the boys are more variable at ages 11 and 14. These results conform to the pattern established on the paragraph meaning test, except that in this case the greater variability of the boys reaches significant proportions at age 11. Table 163 shows that the girls at this age were slightly, though not significantly, more

TABLE 162

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	158	102.62	180	114.11	157/179	.899
11	185	138.49	197	99.94	184/196	1.39 *
14	199	64.30	163	50.64	198/162	1.27

TABLE 163

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLE IN INTELLIGENCE AT AGE 11

Boys		Girls		df	F
No.	Variance	No.	Variance		
177	228.71	193	244.14	176/192	.937

variable in intelligence.

The distributions of the present samples on the word meaning test are shown in Table 164. The difficulty of the test at age 7 is again

TABLE 164

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN LEEDS SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48			25	20	6	2
42-44			29	25	21	18
39-41			21	29	38	31
36-38	2	1	13	24	47	29
33-35	3	7	17	19	26	18
30-32	9	13	15	17	14	25
27-29	7	15	7	12	14	14
24-26	8	13	6	13	7	11
21-23	9	11	14	6	7	4
18-20	8	8	8	11	9	5
15-17	8	12	10	11	5	5
12-14	15	7	9	7	2	1
9-11	18	13	6	1	1	
6- 8	21	33	5	1	2	
3- 5	23	25		1		
0- 2	27	22				
Totals	158	180	185	197	199	163

reflected by the high frequency of scores in the lowest intervals. The reverse was true at age 11, where scores tended to run high. The lack of an adequate test ceiling at this age suppresses the variability of both the boys and girls, but the indication is that a higher ceiling would not have changed the outcome of the comparison of variances, except perhaps to exaggerate the greater variability of the boys. The individual variation within groups continues to dominate the picture and the overlap of the distributions remains large at each age. No significant differences were found between the mean scores of the boys and girls in the Leeds samples on this test.

Spelling. The comparison of the variances of the boys and girls in the Leeds samples on the Metropolitan Spelling Test is reported in Table 165. The same pattern of differences is observed as on the paragraph and word meaning tests, the girls showing the greater variability at age 7 and the boys at ages 11 and 14. These differences occur without being significant.

TABLE 165

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	158	45.81	179	49.48	157/178	.926
11	185	159.42	196	132.96	184/195	1.20
14	199	145.93	163	120.60	198/162	1.21

Table 166 presents the distributions of the boys and girls in the Leeds samples on the spelling test. Both the boys and girls run the whole gamut of possible scores at every age, illustrating once again the hazard of applying group findings to individuals. It may be recalled that the girls had the higher mean scores on this test at all ages. The differences were significant at ages 11 and 14. However, the mean differences tend to suffer an eclipse when viewed in the light of the individual variation within each group. Both boys and girls are found in every interval of the distributions. You might almost call it a total eclipse.

TABLE 166

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
48-50			2	7	3	4
45-47			7	16	10	12
42-44			13	12	7	10
39-41			14	26	16	21
36-38			13	27	15	17
33-35			9	12	17	17
30-32			11	18	16	21
27-29			13	14	24	11
24-26	4	5	16	15	15	13
21-23	19	38	13	15	19	7
18-20	18	24	13	10	14	9
15-17	20	12	13	5	13	7
12-14	19	16	17	5	4	3
9-11	22	28	12	6	7	3
6- 8	22	30	10	3	5	5
3- 5	23	16	4	2	5	1
0- 2	11	10	5	3	9	2
Totals	158	179	185	196	199	163

Handwriting. The variances of the boys and girls in the Leeds samples whose handwriting was assessed are compared on the Metropolitan Handwriting Scale in Table 167. The girls are more variable at all ages, but at no

TABLE 167

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	50	133.67	50	145.40	49/49	.919
11	50	20.57	50	21.27	49/49	.967
14	50	31.63	50	32.88	49/49	.962

age is the difference significant. The distributions displayed in Table 168 show that the variability of both the boys and girls decreases considerably after age 7. Otherwise, the distributions are similar at each age, although the ratings of the girls tend to run higher. The differences between the mean ratings favored the girls at all ages. The difference was significant at age 14.

TABLE 168

DISTRIBUTION OF RATINGS OF BOYS AND GIRLS IN LEEDS SAMPLES ON METROPOLITAN HANDWRITING SCALE

Rating	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
75						1
70		1				2
65	3	4		1	1	4
60	3	6	7	12	3	17
55	5	2	20	23	23	18
50	1	7	18	10	16	7
45	11	5	4	4	4	1
40	7	10	1		1	
35	12	5			2	
30	4	9				
25	2	1				
20	1					
15	1					
Totals	50	50	50	50	50	50

Oral reading. The variances of the boys and girls in the Leeds sample at age 7 who received Gray's Oral Reading Test are compared on this test in Table 169. The boys are more variable, but the difference is not significant. The distributions shown in Table 170 reveal one exceptional

TABLE 169

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN LEEDS SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys		Girls		df	F
No.	Variance	No.	Variance		
24	104.24	25	87.80	23/24	1.19

TABLE 170

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN LEEDS SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Boys	Girls
42-43	1	
.		
.		
28-29		
26-27		
24-25		2
22-23		2
20-21	1	3
18-19	2	1
16-17	1	1
14-15	3	1
12-13		
10-11	1	1
8- 9		2
6- 7	4	1
4- 5	1	1
2- 3		3
0- 1	10	7
Totals	24	25

case among the boys, who performed at better than the 8th grade level on this test, quite an achievement for a child who was still in infant school. Without him, the girls would be slightly though not significantly more variable than the boys on this test. His removal from the sample would also give the girls a larger advantage on the average, but the difference would still not be significant.

PINELLAS SAMPLES

Paragraph meaning. The variances of the boys and girls in the Pinellas samples on the Stanford Paragraph Meaning Test are compared in Table 171. These results conform to the findings of the same comparison of the boys and girls in the Leeds samples, with the girls showing the greater variability at age 7 and the boys at ages 11 and 14. However, none of the differences between the variances of the boys and girls in the Leeds samples on this test was significant, while the present comparison yields a significant difference at age 11. Table 172 shows that the boys in the Pinellas sample at this age were also more variable in intelligence, but the difference is not significant.

TABLE 171

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	63	73.31	75	91.33	62/74	.803
11	185	68.73	197	51.35	184/196	1.34 *
14	199	46.02	163	37.64	198/162	1.22

TABLE 172

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLE IN INTELLIGENCE AT AGE 11

Boys		Girls		df	F
No.	Variance	No.	Variance		
185	149.79	197	128.62	184/196	1.16

The distributions of the boys and girls in the Pinellas samples on the paragraph meaning test are displayed in Table 173. The greater vari-

TABLE 173

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48		1		1		
42-44	1	2	6	5	2	9
39-41	2	2	18	10	30	17
36-38	1	2	16	18	48	26
33-35		4	32	32	32	28
30-32	2	4	28	23	32	30
27-29	2	5	16	20	18	25
24-26	5	9	24	34	12	11
21-23	4	9	8	24	12	10
18-20	9	10	17	16	3	5
15-17	10	6	8	11	5	1
12-14	13	9	7	3	3	1
9-11	8	10	5		2	
6- 8	4	1				
3- 5	2					
0- 2		1				
Totals	63	75	185	197	199	163

ability of the boys at age 11 stems not from a difference between the range of scores, but from a higher incidence of scores at the extremes of the distribution. Otherwise, the usual individual variation is observed and the overlap of the distributions remains large at each age, including age 7, where a significant difference between mean scores was found in favor of the girls. In fact, the individual variation is the largest at this age; and, if anything, the girls are more variable than the boys. The girls cover the same ground as the boys and then some.

Word meaning. Table 174 shows that the comparison of the variances of the boys and girls in the Pinellas samples on the Stanford Word Meaning Test repeats the pattern of differences obtained from the same comparison on the paragraph meaning test. The girls are more variable at age 7, but the boys show the greater variability at ages 11 and 14. The difference at age 14 is significant in this case. Table 175 indicates that the boys at this age were also more variable in intelligence, although the difference was not significant. When the variances of the boys and girls in the Leeds samples were compared on this test, a similar pattern of differences was obtained, but in that case a significant difference was found at age 11, where the girls were slightly though not significantly more variable in intelligence.

TABLE 174

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD WORD MEANING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	63	56.69	75	59.05	62/74	.960
11	185	87.03	197	70.80	184/196	1.23
14	199	73.09	163	51.91	198/162	1.41 *

TABLE 175

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN PINELLAS SAMPLE IN INTELLIGENCE AT AGE 14

Boys		Girls		df	F
No.	Variance	No.	Variance		
199	185.28	163	159.63	198/162	1.16

The distributions in relation to the present comparison are shown in Table 176. The greater variability of the boys at age 14 derives chiefly

TABLE 176

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN PINELLAS SAMPLES ON STANFORD WORD MEANING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
45-48			7	2	1	3
42-44			12	8	23	19
39-41			13	17	27	22
36-38	1	3	16	16	37	25
33-35	1	2	15	29	28	19
30-32	3	2	25	23	21	23
27-29	2	1	13	23	14	20
24-26	2	6	25	20	13	14
21-23	5	10	20	20	9	10
18-20	9	9	14	19	10	5
15-17	11	17	12	11	9	3
12-14	9	11	7	4	4	
9-11	11	5	4	2	1	
6- 8	8	7	2	3	1	
3- 5	1	1			1	
0- 2		1				
Totals	63	75	185	197	199	163

from the extension of the distribution toward the lower end. There is little choice between the distributions at the other ages, where significant differences between the variances of the samples were not found. Significant differences between the mean scores of the present samples on this test were not obtained at any age.

JACKSON SAMPLES

Spelling. Table 177 shows that the boys in the Jackson samples were more variable than the girls on the Metropolitan Spelling Test at all ages, but none of the differences is significant. These results differ from the outcome of the corresponding comparison of Leeds children only at age 7, where the girls in the Leeds sample were slightly more variable than the boys, but significant differences were found at no age in either comparison.

TABLE 177

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN SPELLING TEST

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	149	20.55	152	15.15	148/151	1.36
11	150	107.08	154	94.02	149/153	1.14
14	142	113.08	162	108.34	141/161	1.04

The distributions of the spelling scores of the boys and girls in the Jackson samples are shown in Table 178. It has already been reported that the girls in these samples obtained significantly higher mean scores on this test than the boys at all ages. However, attention should again be called to the overlap of the distributions at each age. The performance of the girls at age 11 is the only one where the boys were unable to give at least one matching performance. At this age, one girl had a

TABLE 178

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN SPELLING TEST

Score	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
48-45				1	1	3
45-47			1	4	2	5
42-44			3	9	2	3
39-41			8	8	1	6
36-38			8	9	2	7
33-35			6	13	6	11
30-32			13	14	2	20
27-29			17	16	9	16
24-26			20	20	14	19
21-23			15	17	21	17
18-20	4	2	13	18	17	11
15-17	6	7	8	10	11	12
12-14	14	19	14	8	6	14
9-11	27	37	12	3	14	10
6- 8	29	47	5	3	16	4
3- 5	39	29	4	1	10	2
0- 2	30	11	3		8	2
Totals	149	152	150	154	142	162

higher score than any boy, while no girl was in the lowest category of scores. Boys outnumber girls among the poorest spellers at the other ages as well.

Handwriting. The variances of the boys and girls in the Jackson samples included in the study of handwriting are compared on the Metropolitan Handwriting Scale in Table 179. The boys show the greater variability at age 7, but the difference is not significant. The differences are of opposite sign at ages 11 and 14, where the girls are significantly more variable than the boys. The handwriting of the girls in the Leeds samples was more variable than that of the boys at all ages, but none of those differences was significant.

TABLE 179

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN HANDWRITING SCALE

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
7	50	64.86	50	51.80	49/49	1.25
11	50	30.87	50	58.16	49/49	.531*
14	50	18.37	50	55.06	49/49	.334**

Table 180 compares the variances in intelligence of the boys and girls in the original Jackson samples at ages 11 and 14. The tests involved were the Lorge-Thorndike Group Intelligence Test at age 11 and the Verbal Reasoning and Numerical Ability subtests of the Differential Aptitude Tests at age 14. While the previous comparison has shown that the girls at ages 11 and 14 were significantly more variable in handwriting, the results reported in Table 180 indicate that the boys in the original samples at these ages were slightly though not significantly more variable in intelligence. These results can also be applied to the partial

TABLE 180

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLES IN INTELLIGENCE AT AGES 11 AND 14

Age	Boys		Girls		df	F
	No.	Variance	No.	Variance		
11	144	226.50	146	182.79	143/145	1.24
14	141	176.89	161	154.75	140/160	1.14

samples used in the study of handwriting, since these samples were drawn at random from the original groups. High correlations have not been found between the quality of handwriting and mental test performance.

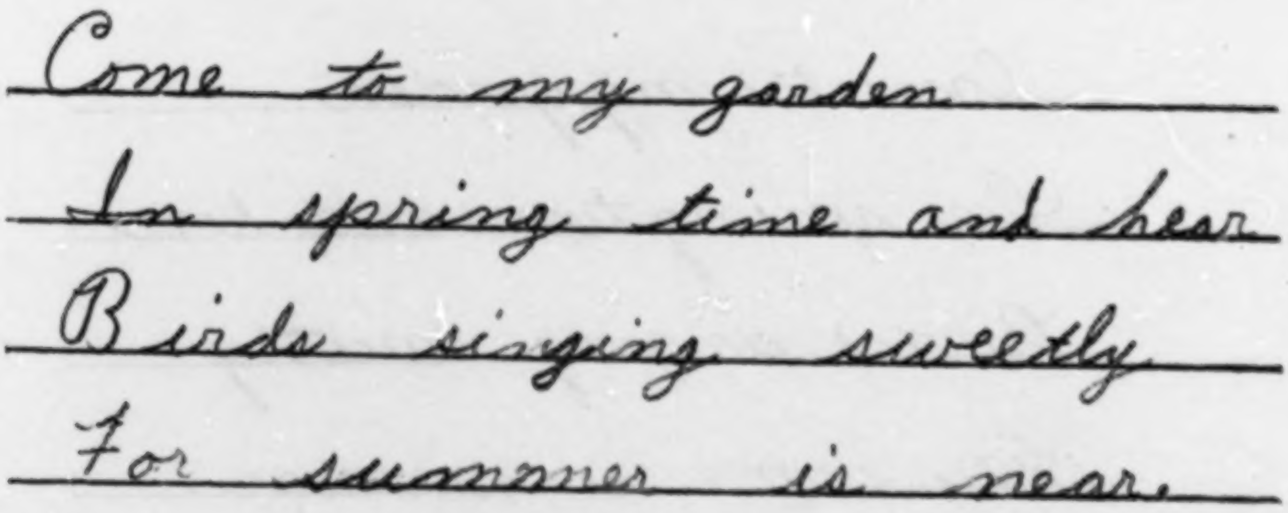
The distributions of the boys and girls in the Jackson samples on the handwriting scale may be studied in Table 181. The greater variability of the girls at age 11 involves a wider range of scores and at age 14 less concentration of scores in a single interval. Exhibits 16 and 17 illustrate the extremes of the distributions at age 14, where the largest difference was found between the variances of the boys and girls in these samples on the handwriting scale. The comparison of the mean handwriting

TABLE 181

DISTRIBUTION OF RATINGS OF BOYS AND GIRLS IN JACKSON SAMPLES ON METROPOLITAN HANDWRITING SCALE

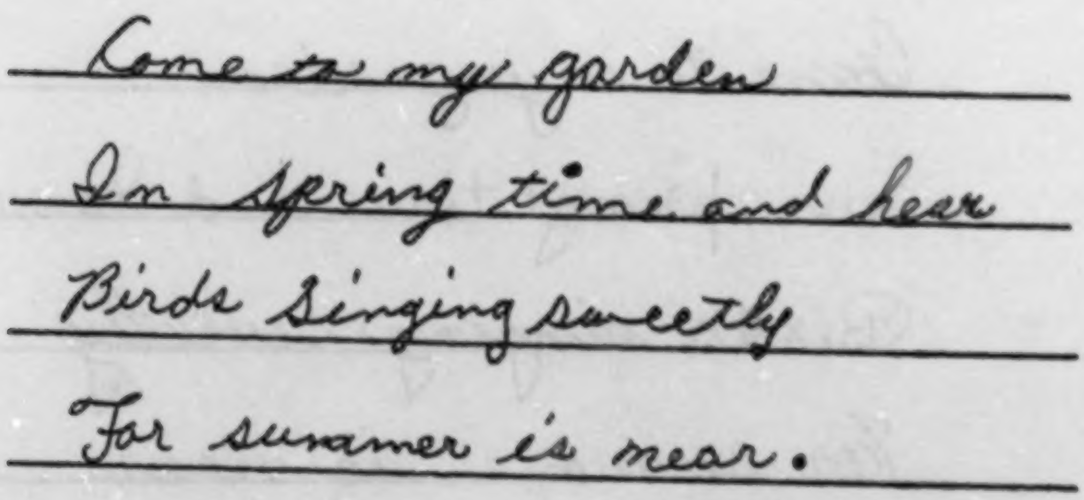
Rating	Age 7		Age 11		Age 14	
	Boys	Girls	Boys	Girls	Boys	Girls
75				1		3
70			1	4		9
65			1	2		4
60			6	5	2	11
55	1	2	24	21	25	17
50	1	6	12	12	15	6
45	5	14	4	3	7	
40	7	14	2	1	1	
35	17	5		1		
30	6	8				
25	9	1				
20	4					
Totals	50	50	50	50	50	50

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

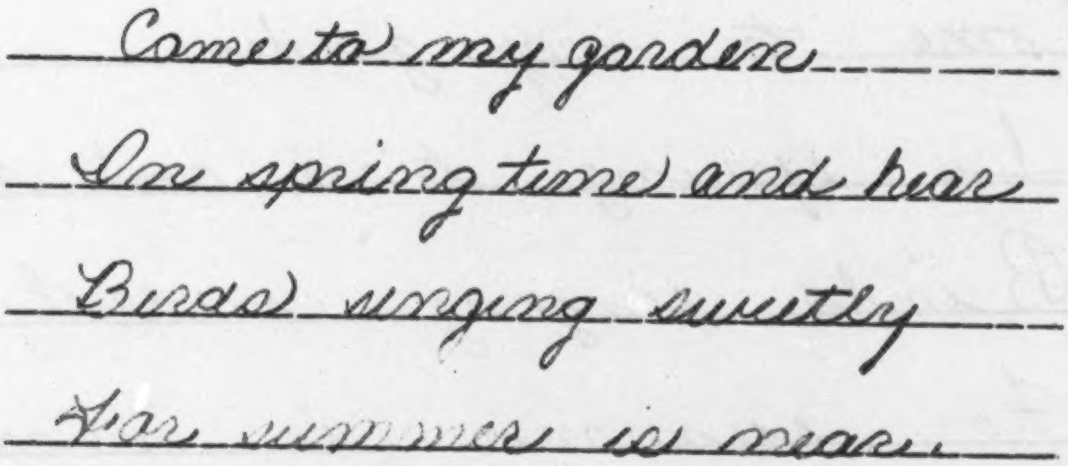
Lowest Rated



Come to my garden
In spring time and hear
Birds Singing sweetly
For summer is near.

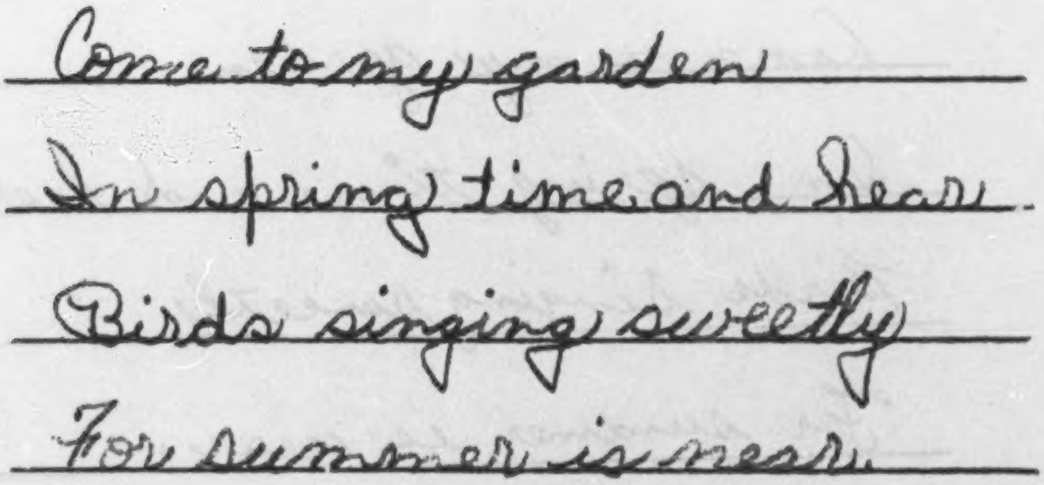
Exhibit 16. Contrast between highest and lowest rated products of handwriting of boys in Jackson sample at age 14.

Highest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Lowest Rated



Come to my garden
In spring time and hear
Birds singing sweetly
For summer is near.

Exhibit 17. Contrast between highest and lowest rated products of handwriting of girls in Jackson sample at age 14.

ratings of these boys and girls favored the girls at all ages. The differences were significant at ages 7 and 14. The superiority of the girls is especially apparent at age 14, where the exhibits will show a difference in favor of the girls at both ends of the distributions.

Oral reading. The variances of the boys and girls in the Jackson sample at age 7 participating in the study of oral reading are compared on Gray's Oral Reading Test in Table 182. The girls are a little more variable than the boys, but the difference is not significant. The reverse relationship was found in the corresponding Leeds comparison, where the boys were slightly though not significantly more variable than the girls. One exceptionally gifted reader among the boys made the difference. Without him, the girls would have been insignificantly more variable, just as in the present comparison.

TABLE 182

COMPARISON OF VARIANCES OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Boys		Girls		df	F
No.	Variance	No.	Variance		
26	23.52	23	39.06	25/22	.602

The distributions shown in Table 183 call attention once again to the high frequency of low scores among the children of this sample. Since these children were younger than the Jackson sample employed in the same comparison with West Lothian children, they naturally found the test more difficult. The girls fared only a trifle better than the boys. The difference between the mean scores favored the girls by less than a test point, far from a significant difference.

TABLE 183

DISTRIBUTION OF SCORES OF BOYS AND GIRLS IN JACKSON SAMPLE AT AGE 7 ON GRAY'S ORAL READING TEST

Score	Boys	Girls
20-21		1
18-19		1
16-17	1	
14-15		1
12-13	1	
10-11	2	
8- 9	3	1
6- 7		1
4- 5	1	2
2- 3	1	2
0- 1	17	14
Totals	26	23

Comparison of Spelling Errors of Jackson and Leeds Samples

Left to compare are the spelling errors of the Jackson and Leeds samples. The agenda remain the same as in the corresponding comparison of the Jackson and West Lothian samples. The most common misspellings of the samples will first be compared. Then will follow a comparison of the readability of the misspellings of the samples. Of special interest again will be evidence of the application of phonics to spelling.

COMPARISON OF MOST COMMON MISSPELLINGS

Tables 184, 185, and 186 compare the most common misspellings of the Jackson and Leeds samples on each word of the spelling test at each age level. The words are listed in the order in which they were presented

TABLE 184

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND LEEDS SAMPLES AT AGE 7

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
1. cow	caw	caw	5	42
2. good	goob	gud	13	42
3. she	seh	shee	4	4
4. can	con	con	14	6
5. red	rad	reb	23	5
6. her	har	har	11	23
7. ball	boll	boll	17	66
8. week	wek	weec	34	29
9. little	littel	littel	10	14
10. came	cam	cam	11	28
11. ran	run	run	32	8
12. ride	riad	rid	15	44
13. cake	cak	cak	13	14
14. our	owr	aw	6	15
15. night	niet	nit	8	39
16. send	sand	sed	17	17
17. inside	insid	insid	23	63
18. light	lit	lit	18	63
19. pencil	psl	pensil	4	39
20. garden	garder	gaden	7	10
21. basket	backst	bascit	5	29
22. short	shrt, srt	shot	5	69
23. bread	brad	bred	13	133
24. write	rit	rit	8	52

TABLE 185

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND LEEDS SAMPLES AT AGE 11

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
1. lost	lose	lossed	6	2
2. funny	*	funy		11
3. study	stuidy sutdy	studey	3 3	13
4. these	theese thease	thees	5 5	7
5. sound	sond sownd sould	souned	2 2 2	3
6. lie	ly	liy	15	30
7. hurt	heart	hert	11	42
8. leave	leve	leve	13	18
9. bottle	bottel	bottel	8	11
10. blood	blod blud	blud	5 5	26
11. pumps	pumpes	pumpes	10	10
12. knew	new	new	43	74
13. whom	whome	hoom	8	21
14. wore	war ware	war	20 20	20
15. vacation	vaction	vaccation	64	18
16. wrong	rong worng	rong	5 5	39
17. straw	stan	strow	7	11
18. interesting	interresting	intresting**	6	49

*In Jackson, 7 different misspellings were discovered for this word, each one used only once.

**Acceptable British pronunciation.

TABLE 185 (continued)

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
19. fountain	founten	founten	20	14
20. bowl	blow	bole	23	7
21. allowed	aloud	aloud	162	109
22. swept	sweep	sweept	12	14
23. prepared	perpared	preperd	23	32
24. cousin	cosin	couson	10	20
25. pickle	pickel	pickel	85	30
26. whose	who's	who's	41	40
27. limb	lim	lim	48	56
28. soldier	solder	soilder	26	21
29. usual	usaul	useual	13	26
30. flutter	fluter	fluter	51	70
31. fare	fair	fair	161	68
32. admission	admition	admision	29	38
33. material	meterial	meterial materal	22	12 12
34. athletics	atletics	athletices	20	10
35. examination	examanation	examanation	17	7
36. liquor	licker	licker	38	99
37. electricity	electricty	electrisity	25	16
38. disappointed	disapointed	disapointed	120	76
39. attitude	atatude	atitude	18	73
40. patience	patients	patients	48	16
41. quantities	quanties	quantites	17	14
42. obedient	obedent	obedent	38	37
43. vacancy	vacency	vacansy	14	21

TABLE 185 (concluded)

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
44. gymnasium	gymnasiam	gymnasiam	14	31
45. principal	principle	principle	28	35
46. associate	asosheate	assosiate	21	30
47. algebra	algabra	aljebra	25	26
48. deceive	decive	decive	56	35
49. assistance	asistance	asistance	19	48
50. thoroughly	thurily	thouraly throughly	16	13 13

TABLE 186

COMPARISON OF MOST COMMON MISSPELLINGS OF JACKSON AND LEEDS SAMPLES AT AGE 14

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
1. allowed	aloud	aloud	77	56
2. swept	sweapt	sweeped	16	13
3. prepared	perpared	prepered	13	7
4. cousin	couisn	cousen	4	7
5. pickle	pickel	pickel	43	17
6. whose	who's	who's	71	48
7. limb	lime	lim	8	14
8. soldier	solider	soilder	18	11
9. usual	usuall	usuall	13	24
10. flutter	fluter	fluter	18	16
11. fare	fair	fair	50	27
12. admission	addmission admittion	admision	11 11	23
13. material	materal	meterial	9	7
14. athletics	atheletics	atheletics	13	9
15. examination	examanation	examanation	12	8
16. liquor	liquior	liquer	17	74
17. electricity	electricty	electricty	41	9
18. disappointed	disapointed	disapointed	93	90
19. attitude	atitude	atitude	42	72
20. patience	patients	patients	74	15
21. quantities	quanties	quantites	37	18
22. obedient	obediant	obediant	22	56
23. vacancy	vacance	vacency	11	52
24. gymnasium	gymnasiam	jimnasium	15	6

TABLE 186 (concluded)

Test Word	Most Common Error		Frequency of Error	
	Jackson	Leeds	Jackson	Leeds
25. principal	principle	principle	44	106
26. associate	asociate	assosiate	10	25
27. algebra	algerbra	algabra	37	8
28. deceive	decieve	decieve	81	93
29. assistance	assitance	asistance	36	36
30. thoroughly	throughly	throughly	75	23
31. straightened	straighten	straightend	44	26
32. patronage	patrinage	patronidge	26	17
33. capacity	capasity	capasity	26	29
34. courteous	curtious	curtious	82	71
35. advantageous	advantagous	advantagous	49	51
36. comparatively	comparitively	comparitively	74	62
37. schedule	schedual	shedual*	24	53
38. insignificant	insignifigant	incignificant	11	21
39. ridiculous	rediculous	rediculous	58	38
40. physician	physican	phisician	18	19
41. unanimous	unanamous	unanimus	33	30
42. approximately	approximatly	approximatly	25	48
43. emphasizes	emphisizes	emphasises	12	121
44. inconvenience	inconvience	inconveniance	25	52
45. specifically	specificly	specificaly	21	24
46. analysis	analisis	analisis analasis	22	23 23
47. supplementary	suplementary	suplementary	22	51
48. criticism	critisism	critisism	14	48
49. simultaneous	simotanious	simultanious	31	24
50. prejudice	predjudice	predudice	9	54

*Acceptable British pronunciation.

during the test. Phonetic misspellings are underlined. An error was classified as phonetic if the word could be understood when pronounced as misspelled. At age 7, an error was judged as phonetic if the letters used could in English have the sounds attributed to them regardless of their relation to other letters of the word. Thus, at this age the letter c was considered as having the sound of either s or k regardless of accompanying letters if the sound selected produced an acceptable phonetic rendition of the correct word. At ages 11 and 14, however, the letters were required to have the sounds intended in the position in which they were used relative to accompanying letters. Exceptions were allowed in the case of failure to double a consonant, like funy for funny. Phonetic renditions of mispronunciations, such as algerbra for algebra, were also included among phonetic errors. The same classification was used in the corresponding comparison of the Jackson and West Lothian samples. For additional examples, the reader is referred to the exposition of the classification system which was offered at that time.

Table 187 shows that the percentage of most common errors classified as phonetic was higher for the Leeds than for the Jackson samples at all ages. The differences at ages 11 and 14 are significant. A difference of comparable size was obtained at age 7, but the smaller number of words

TABLE 187

COMPARISON OF PERCENTAGES OF MOST COMMON MISSPELLINGS OF JACKSON AND LEEDS SAMPLES CLASSIFIED AS PHONETIC ERRORS

Age	Jackson		Leeds		Difference	z
	No.	Percentage	No.	Percentage		
7	24	33.33	24	58.33	-25.00	1.74
11	50	51.66	50	80.00	-28.34	2.99**
14	50	63.00	50	82.00	-19.00	2.13*

in the test at this age blunts the statistical tool. A related finding is that there were only two cases in which the most common misspelling was phonetic for Jackson and not for Leeds, to wit, word number 14 at age 7 and word number 27 at age 14. Conversely, there were 7 most common misspellings at age 7 and 12 each at ages 11 and 14 which were phonetic for Leeds but not for Jackson. More of the Leeds than of the Jackson errors conform to pronunciation, any way they are examined.

COMPARISON OF READABILITY OF MISSPELLED WORDS

For the tests of readability of misspellings, one misspelling of each test word was drawn at random from each sample at each age. The only ground rules applied were to include no misspelling more than once in the same test and no misspelling which was the correct spelling of another word. Another misspelling of the same word was drawn at random as these rules required. Misspellings at each age were combined into a single list, with the Jackson and Leeds misspellings alternating, beginning with the Jackson specimen. Moreover, half of the Jackson misspellings occurred before the Leeds misspellings of the same word, and vice versa. These measures were taken to control practice effects. Copies of the final tests may be examined in Appendix C.

The three tests of readability were administered to three sections of an undergraduate course in education, each group receiving a different test. A fourth class in education received the tests with sufficient copies of each form distributed to produce nearly equal numbers of results. Examinees were instructed to write their answers without going back to previous items. All tests were administered by the same project investigator. Table 188 indicates that significantly higher mean scores were made on the Leeds than on the Jackson misspellings at all ages. The greater application of phonics to spelling by the Leeds samples doubtless contributes to these results, since phonetic misspellings are by nature easier to understand than non-phonetic errors.

TABLE 188

COMPARISON OF READABILITY OF MISSPELLINGS
OF JACKSON AND LEEDS SAMPLES

Age	Jackson			Leeds			Difference	df	t
	No.	Mean	s	No.	Mean	s			
7	31	3.52	1.93	31	7.71	1.75	-4.19	58	8.96**
11	32	25.94	3.27	32	28.28	2.75	-2.34	62	3.10**
14	32	34.72	2.50	32	40.31	2.70	-5.59	65	8.58**

CHAPTER VIII

SUMMARY

Problem

This investigation was designed to compare the performance of groups of English and Scottish children with the American norms and with the performance of similar groups of American children on a series of reading and spelling tests and a handwriting scale standardized in the United States. The object was to obtain evidence in relation to the following differences in educational practice:

1. Reading, handwriting, and spelling instruction is usually begun about a year earlier in English and Scottish schools than in American schools.

2. The school year is somewhat longer in England and Scotland than in the United States.

3. English and Scottish schools probably give somewhat more attention to phonics in beginning reading than do most American schools. This judgment is based in part on evidence that the most frequently used basic readers in England and Scotland incorporate special provisions for the application of phonics to reading which are not found in comparable series of American readers. The attention given to phonics naturally tends to increase the time devoted to oral reading.

4. The favorite series of English and Scottish basic readers present less repetition per word than do similar series of American readers. This is to say that the English and Scottish series move at a more rapid pace and hence pose a greater challenge to the child.

5. Both English and Scottish children sit for a qualifying examination for entrance to secondary school. This examination probably affects the curriculum by increasing the emphasis on academic learning in primary schools.

In the final analysis, this investigation was designed to test the proposition advanced by certain critics of American schools that British education is superior to American education. Reading is a key subject to investigate for this purpose, because the child's achievement in other subjects depends so much on reading. It has been said that the standard of reading goes to the root of any national system of education. Handwriting and spelling were included in the comparisons, since the ability to write and spell is commonly developed simultaneously with the ability to read. It was hypothesized that no really significant differences would emerge from these comparisons, even though English and Scottish children begin their primary education about a year earlier than American children and receive a program which is probably somewhat more formal and academic than the program usually found in American schools. This hypothesis was predicated on the proposition that any gain derived from advancing the age of beginning instruction and a concentration on academic learning would be short-lived and limited in size.

Procedure

SUBJECTS

This investigation was limited to the approximate ages 7, 11, and 14. These are strategic ages for the purposes of the experiment. By age 7, children have usually had sufficient practice in reading, handwriting, and spelling to permit reliable measurements of these skills. At age 11, English and Scottish children face the prospect of the qualifying examination for entrance to secondary school. At age 14, English and Scottish children are in their last year of school before the school leaving age of 15. This is the last age at which it is possible to get a sample of an intact age group.

The British samples were obtained from the county borough of Leeds, Yorkshire, England, and from West Lothian County, Scotland. The choice of these sources of subjects was based on evidence that each is fairly representative of the intelligence and attainments of children in the two countries concerned. The sample sizes were 300-plus at each age in each country. Jackson, Michigan, and Pinellas County, Florida, served as sources of comparable data on American children. Different groups of Jackson and Pinellas children were used in the comparisons with the Leeds and West Lothian samples in order to accommodate a difference between the mean ages of the latter samples resulting from a difference in the practice of admitting children to the infant division. The investigation, therefore, was conducted as two separate studies, one identified with the Leeds samples, the other with the West Lothian samples.

TEST INSTRUMENTS

The testing program included an assessment of reading comprehension, reading vocabulary, spelling, handwriting, and oral reading. The Paragraph Meaning and Word Meaning subtests of Form J of the Stanford Achievement Test were used to test reading comprehension and reading vocabulary. The Primary Battery was used at age 7, the Intermediate Battery at age 11, and the Advanced Battery at age 14. The Spelling subtest of the 1947 edition of the Metropolitan Achievement Tests was used to test spelling achievement. A spelling test of the dictation type was required in order to compare the misspellings of the national samples. The 1947 edition of the Metropolitan Achievement Test is one of the few American achievement batteries which incorporates a spelling test of this type at all ages. The Metropolitan Handwriting Scale was used to judge the quality of handwriting. An addition was made to the specimens making up the scale to permit its use with the older age groups. The test of oral reading consisted of Gray's Standaridzed Oral Reading Paragraphs. All were group tests with the exception of the oral reading test.

TEST ADMINISTRATION

The Leeds and West Lothian samples were obtained by testing whole classes at the ages concerned in a variety of schools in each setting. Only schools corresponding to the public schools in the United States were included as sources of subjects. In Leeds, the group tests were administered with the assistance of a team of examiners from the Office of the Senior Educational Psychologist, Child Guidance Centre. In West Lothian, the teachers assisted with the group testing. One of the project investigators administered the oral reading test both in Leeds and West Lothian. This test was confined to a systematic sample of 50 children from the complete sample at age 7 in each country. The group tests were given to the complete samples at all ages in both countries.

Scores for similar groups of American children were obtained on the Stanford Paragraph and Word Meaning Tests from Pinellas County, Florida, and on the Metropolitan Spelling Test, the Metropolitan Handwriting Scale, and Gray's Oral Reading Test from Jackson, Michigan. The Jackson samples were obtained by testing whole classes in a variety of schools in the city. This was similar to the procedure employed in Leeds and West Lothian. The group tests were administered in Jackson with the assistance of examiners employed through the Office of Pupil Services. The test of oral reading was administered by the same project investigator who gave the test in Leeds and West Lothian. This test was limited to a systematic sample of 50 children at age 7, just as in Leeds and West Lothian.

The choice of Pinellas County as a source of Stanford scores was based on knowledge that these scores were already available in Pinellas, where the same test forms as used in Leeds and West Lothian had been used in the county's own testing program in the past. These records were used to identify groups of Pinellas children to compare with the Leeds and West Lothian samples on the Stanford Paragraph and Word Meaning Test. The tests in Pinellas had been administered by classroom teachers following a program of in-service training.

DATA ANALYSIS

The comparisons of the Leeds and West Lothian samples with the test norms were conducted in two ways. The sample means were first compared with the scores that "normal" groups of American children of the same age would be expected to achieve on the tests. The sample means were then compared with the scores that "normal" groups of American children one year above the mean age of the samples would be expected to attain on the tests. A comparison on the latter basis tends to equalize years of instruction, but at the same time gives American children the benefit of an additional year of maturity. It was felt that such a comparison might serve further to illuminate the relationship between developmental and instructional factors in learning to read and spell. Handwriting was excluded from these comparisons, since the Metropolitan Handwriting Scale does not furnish norms which lend themselves to this purpose.

In addition, the mean scores of the Leeds and West Lothian samples were compared with the mean scores of the Jackson samples on the Metropolitan Spelling Test, the Metropolitan Handwriting Scale, and Gray's Oral Reading Test, and with the mean scores of the Pinellas samples on the Stanford Paragraph and Word Meaning Tests. The variances of these samples were also compared on the tests concerned. The analysis of the spelling records included a comparison of the spelling errors of the Leeds and West Lothian samples and the groups of Jackson children. Finally, advantage was taken of the opportunity to compare the mean scores and variances of the boys and girls in the various samples on the tests they received. The principal results were as follows, separated according to the distinction which was made between the Leeds and West Lothian studies.

West Lothian Comparisons with American Children

COMPARISONS OF CENTRAL TENDENCY

1. On the Stanford Paragraph Meaning Test, the mean scores of the West Lothian samples were significantly above the norms at ages 7 and 11, but significantly below the norm at age 14.

2. On the Stanford Paragraph Meaning Test, the mean scores of the West Lothian samples fell significantly below the norms at all ages, when the norms were computed at 12 months above the mean ages of the samples.

3. On the Stanford Paragraph Meaning Test, the mean scores of the West Lothian samples were significantly above the mean scores of the Pinellas samples at ages 7 and 11, but significantly below the mean score of the Pinellas sample at age 14.

4. On the Stanford Paragraph Meaning Test, the mean scores of the Pinellas samples were above the norms at all ages. The differences were significant at ages 7 and 14, but not at age 11.

5. On the Stanford Word Meaning Test, the mean scores of the West Lothian samples were significantly above the norms at all ages.

6. On the Stanford Word Meaning Test, the mean scores of the West Lothian samples fell below the norms at all ages, when the norms were computed at 12 months above the mean ages of the samples, but the differences were not significant.

7. On the Stanford Word Meaning Test, the mean scores of the West Lothian samples were significantly above the mean scores of the Pinellas samples at ages 7 and 11. The mean score of the Pinellas sample was above the mean score of the West Lothian sample at age 14, but the difference was not significant.

8. On the Stanford Word Meaning Test, the mean scores of the Pinellas samples were significantly above the norms at ages 7 and 14. The mean score of the Pinellas sample was below the norm at age 11, but the

difference was not significant.

9. On the Metropolitan Spelling Test, the mean scores of the West Lothian samples were significantly above the norms at all ages.

10. On the Metropolitan Spelling Test, the mean scores of the West Lothian samples remained above the norms at all ages, when the norms were computed at 12 months above the mean ages of the samples. The differences were significant at ages 7 and 11, but not at age 14.

11. On the Metropolitan Spelling Test, the mean scores of the West Lothian samples were significantly above the mean scores of the Jackson samples at all ages.

12. On the Metropolitan Spelling Test, the mean scores of the Jackson samples were above the norms at ages 7 and 11. The difference was significant at age 7, but not at age 11. The mean score of the Jackson sample was significantly below the norm at age 14.

13. On the Metropolitan Handwriting Scale, the mean ratings of the West Lothian samples were above the mean ratings of the Jackson samples at all ages. Differences were significant at ages 7 and 11, but not at age 14.

14. On Gray's Oral Reading Test at age 7, the mean score of the West Lothian sample was significantly above the norm.

15. On Gray's Oral Reading Test at age 7, the mean score of the West Lothian sample fell below the norm, when the norm was computed at 12 months above the mean age of the sample, but the difference was not significant.

16. On Gray's Oral Reading Test at age 7, the mean score of the West Lothian sample was significantly above the mean score of the Jackson sample.

17. On Gray's Oral Reading Test at age 7, the mean score of the Jackson sample was above the norm, but the difference was not significant.

18. The percentage of the most common misspellings classified as

phonetic errors was higher for the West Lothian than for the Jackson samples at all ages. The differences were significant at ages 7 and 11, but not at age 14.

19. On the tests of readability of misspellings, significantly higher scores were made on the West Lothian than on the Jackson misspellings at all ages.

COMPARISONS OF VARIANCES

1. On the Stanford Paragraph Meaning Test, the West Lothian samples were more variable than the Pinellas samples at all ages. The differences were significant at ages 7 and 14, but not at age 11.

2. On the Stanford Word Meaning Test, the West Lothian samples were more variable than the Pinellas samples at ages 7 and 14, but the differences were not significant. The Pinellas sample was significantly more variable than the West Lothian sample at age 11.

3. On the Metropolitan Spelling Test, the Jackson samples were significantly more variable than the West Lothian samples at ages 11 and 14. The West Lothian sample was more variable than the Jackson sample at age 7, but the difference was not significant.

4. On the Metropolitan Handwriting Scale, the Jackson samples were more variable than the West Lothian samples at all ages. The difference was significant at age 14, but not at age 7 or 11.

5. On Gray's Oral Reading Test at age 7, the West Lothian sample was more variable than the Jackson sample, but the difference was not significant.

6. The overlap of the distributions of the national samples compared was large at each age on each test.

Comparisons of Boys and Girls within National Samples

COMPARISONS OF CENTRAL TENDENCY

1. On the Stanford Paragraph Meaning Test, the mean score of the girls in the West Lothian sample was significantly above the mean score of the boys at age 7. The mean scores of the boys were significantly above the mean scores of the girls at ages 11 and 14.

2. On the Stanford Paragraph Meaning Test, the mean score of the girls in the Pinellas sample was significantly above the mean score of the boys at age 7. The mean scores of the boys were above the mean scores of the girls at ages 11 and 14, but the differences were not significant.

3. On the Stanford Word Meaning Test, the mean score of the girls in the West Lothian sample was significantly above the mean score of the boys at age 7. The mean scores of the boys were significantly above the mean scores of the girls at ages 11 and 14.

4. On the Stanford Word Meaning Test, the mean scores of the girls in the Pinellas samples were above the mean scores of the boys at all ages. The difference was significant at age 7, but not at age 11 or 14.

5. On the Metropolitan Spelling Test, the mean scores of the girls in the West Lothian samples were above the mean scores of the boys at all ages. The differences were significant at ages 7 and 14, but not at age ff.

6. On the Metropolitan Spelling Test, the mean scores of the girls in the Jackson samples were significantly above the mean scores of the boys at all ages.

7. On the Metropolitan Handwriting Scale, the mean ratings of the girls in the West Lothian samples were above the mean ratings of the boys at ages 7 and 14, but the differences were not significant. The mean rating of the boys was above the mean rating of the girls at age 11, but the difference was not significant.

8. On the Metropolitan Handwriting Scale, the mean ratings of the girls in the Jackson samples were above the mean ratings of the boys at all ages. The differences were significant at ages 11 and 14, but not at

age 7.

9. On Gray's Oral Reading Test at age 7, the mean score of the girls in the West Lothian sample was significantly above the mean score of the boys.

10. On Gray's Oral Reading Test at age 7, the mean score of the girls in the Jackson sample was above the mean score of the boys, but the difference was not significant.

COMPARISONS OF VARIANCES

1. On the Stanford Paragraph Meaning Test, the boys in the West Lothian samples were more variable than the girls at ages 7 and 11, but the differences were not significant. The girls were more variable than the boys at age 14, but the difference was not significant.

2. On the Stanford Paragraph Meaning Test, the boys in the Pinellas samples were more variable than the girls at ages 7 and 11, but the differences were not significant. The girls were more variable than the boys at age 14, but the difference was not significant.

3. On the Stanford Word Meaning Test, the boys in the West Lothian samples were more variable than the girls at ages 7 and 11. The difference was significant at age 7, but not at age 11. The girls were more variable than the boys at age 14, but the difference was not significant.

4. On the Stanford Word Meaning Test, the boys in the Pinellas samples were more variable than the girls at all ages, but the differences were not significant.

5. On the Metropolitan Spelling Test, the boys in the West Lothian samples were significantly more variable than the girls at all ages.

6. On the Metropolitan Spelling Test, the boys in the Jackson samples were more variable than the girls at all ages. The difference was significant at age 7, but not at age 11 or 14.

7. On the Metropolitan Handwriting Scale, the boys in the West Lothian samples were more variable than the girls at ages 7 and 11, but

the differences were not significant. The girls were more variable than the boys at age 14, but the difference was not significant.

8. On the Metropolitan Handwriting Scale, the boys in the Jackson samples were more variable than the girls at ages 7 and 11. The difference was significant at age 7, but not at age 11. The girls were more variable than the boys at age 14, but the difference was not significant.

9. On Gray's Oral Reading Test at age 7, the boys in the West Lothian sample were more variable than the girls, but the difference was not significant.

10. On Gray's Oral Reading Test at age 7, the girls in the Jackson sample were more variable than the boys, but the difference was not significant.

11. The overlap of the distributions of the boys and girls within the national samples was large at each age on each test.

Leeds Comparisons with American Children

COMPARISONS OF CENTRAL TENDENCY

1. On the Stanford Paragraph Meaning Test, the mean scores of the Leeds samples were above the norms at all ages. The difference was significant at age 7, but not at age 11 or 14.

2. On the Stanford Paragraph Meaning Test, the mean scores of the Leeds samples dropped significantly below the norms at all ages, when the norms were computed at 12 months above the mean ages of the samples.

3. On the Stanford Paragraph Meaning Test, the mean scores of the Pinellas samples were above the mean scores of the Leeds samples at ages 7 and 14. The difference was significant at age 14, but not at age 7. The mean score of the Pinellas sample was below the mean score of the Leeds sample at age 11, but the difference was not significant.

4. On the Stanford Paragraph Meaning Test, the mean scores of the

Pinellas samples were significantly above the norms at ages 7 and 14. The sample mean was below the norm at age 11, but the difference was not significant.

5. On the Stanford Word Meaning Test, the mean scores of the Leeds samples were significantly above the norms at all ages.

6. On the Stanford Word Meaning Test, the mean scores of the Leeds samples dropped significantly below the norms at ages 7 and 11, but remained significantly above the norm at age 14, when the norms were computed at 12 months above the mean ages of the samples.

7. On the Stanford Word Meaning Test, the mean scores of the Leeds samples were significantly above the mean scores of the Pinellas samples at ages 11 and 14. The sample means were virtually identical at age 7.

8. On the Stanford Word Meaning Test, the mean scores of the Pinellas samples were significantly above the norms at ages 7 and 14. The sample mean was below the norm at age 11, but the difference was not significant.

9. On the Metropolitan Spelling Test, the mean scores of the Leeds samples were significantly above the norms at all ages.

10. On the Metropolitan Spelling Test, the mean scores of the Leeds sample at age 7 remained significantly above the norm, but the sample means dropped significantly below the norms at ages 11 and 14, when the norms were computed at 12 months above the mean ages of the samples.

11. On the Metropolitan Spelling Test, the mean scores of the Leeds samples were significantly above the mean scores of the Jackson samples at all ages.

12. On the Metropolitan Spelling Test, the mean scores of the Jackson samples were significantly above the norms at ages 7 and 11, but significantly below the norm at age 14.

13. On the Metropolitan Handwriting Scale, the mean rating of the Leeds sample was significantly above the mean rating of the Jackson sam-

ple at age 7. The Jackson samples held the advantage at ages 11 and 14, but the differences were not significant.

14. On Gray's Oral Reading Test at age 7, the mean score of the Leeds sample was significantly above the norm.

15. On Gray's Oral Reading Test at age 7, the mean score of the Leeds sample dropped below the norm, when the norm was computed at 12 months above the mean age of the sample, but the difference was not significant.

16. On Gray's Oral Reading Test at age 7, the mean score of the Leeds sample was significantly above the mean score of the Jackson sample.

17. On Gray's Oral Reading Test at age 7, the mean score of the Jackson sample was below the norm, but the difference was not significant.

18. The percentage of the most common misspellings classified as phonetic errors was higher for the Leeds than for the Jackson samples at all ages. The differences were significant at ages 11 and 14, but not at age 7.

19. On the tests of readability of misspellings, significantly higher scores were made on the Leeds than on the Jackson misspellings at all ages.

COMPARISONS OF VARIANCES

1. On the Stanford Paragraph Meaning Test, the Leeds samples were more variable than the Pinellas samples at all ages. The differences were significant at ages 7 and 11, but not at age 14.

2. On the Stanford Word Meaning Test, the Leeds samples were significantly more variable than the Pinellas samples at ages 7 and 11. The Pinellas sample was more variable than the Leeds sample at age 14, but the difference was not significant.

3. On the Metropolitan Spelling Test, the Leeds samples were more variable than the Jackson samples at all ages. Differences were significant at ages 7 and 11, but not at age 14.

4. On the Metropolitan Handwriting Scale, the Leeds sample was significantly more variable than the Jackson sample at age 7. The Jackson

samples were more variable than the Leeds samples at ages 11 and 14. The difference was significant at age 11, but not at age 14.

5. On Gray's Oral Reading Test at age 7, the Leeds sample was significantly more variable than the Jackson sample.

6. The overlap of the distributions of the national samples compared was large at each age on each test.

Comparisons of Boys and Girls within National Samples

COMPARISONS OF CENTRAL TENDENCY

1. On the Stanford Paragraph Meaning Test, the mean scores of the girls in the Leeds samples were above the mean scores of the boys at ages 7 and 11. The difference was significant at age 7, but not at age 11. The mean scores of the boys and girls were identical at age 14.

2. On the Stanford Paragraph Meaning Test, the mean scores of the girls in the Pinellas samples were above the mean scores of the boys at ages 7 and 14. The difference was significant at age 7, but not at age 14. The mean score of the boys was above the mean score of the girls at age 11, but the difference was not significant.

3. On the Stanford Word Meaning Test, the mean scores of the girls in the Leeds samples were above the mean scores of the boys at ages 7 and 11, but the differences were not significant. The boys held the advantage at age 14, but the difference was not significant.

4. On the Stanford Word Meaning Test, the mean scores of the girls in the Pinellas samples were above the mean scores of the boys at all ages, but the differences were not significant.

5. On the Metropolitan Spelling Test, the mean scores of the girls in the Leeds samples were above the mean scores of the boys at all ages. The differences were significant at ages 11 and 14, but not at age 7.

6. On the Metropolitan Spelling Test, the mean scores of the girls

in the Jackson samples were significantly above the mean scores of the boys at all ages.

7. On the Metropolitan Handwriting Scale, the mean ratings of the girls in the Leeds samples were above the mean ratings of the boys at all ages. The difference was significant at age 14, but not at age 7 or 11.

8. On the Metropolitan Handwriting Scale, the mean ratings of the girls in the Jackson samples were above the mean ratings of the boys at all ages. The differences were significant at ages 7 and 14, but not at age 11.

9. On Gray's Oral Reading Test at age 7, the mean score of the girls in the Leeds sample was above the mean score of the boys, but the difference was not significant.

10. On Gray's Oral Reading Test at age 7, the mean score of the girls in the Jackson sample was above the mean score of the boys, but the difference was not significant.

COMPARISONS OF VARIANCES

1. On the Stanford Paragraph Meaning Test, the girls in the Leeds samples were more variable than the boys at age 7, but the difference was not significant. The boys were more variable than the girls at ages 11 and 14, but the differences were not significant.

2. On the Stanford Paragraph Meaning Test, the girls in the Pinellas samples were more variable than the boys at age 7, but the difference was not significant. The boys were more variable than the girls at ages 11 and 14. The difference was significant at age 11, but not at age 14.

3. On the Stanford Word Meaning Test, the girls in the Leeds samples were more variable than the boys at age 7, but the difference was not significant. The boys were more variable than the girls at ages 11 and 14. The difference was significant at age 11, but not at age 14.

4. On the Stanford Word Meaning Test, the girls in the Pinellas samples were more variable than the boys at age 7, but the difference

was not significant. The boys were more variable than the girls at ages 11 and 14. The difference was significant at age 14, but not at age 11.

5. On the Metropolitan Spelling Test, the girls in the Leeds samples were more variable than the boys at age 7, but the difference was not significant. The boys were more variable than the girls at ages 11 and 14, but the differences were not significant.

6. On the Metropolitan Spelling Test, the boys in the Jackson samples were more variable than the girls at all ages, but the differences were not significant.

7. On the Metropolitan Handwriting Scale, the girls in the Leeds samples were more variable than the boys at all ages, but the differences were not significant.

8. On the Metropolitan Handwriting Scale, the boys in the Jackson samples were more variable than the girls at age 7, but the difference was not significant. The girls were significantly more variable than the boys at ages 11 and 14.

9. On Gray's Oral Reading Test at age 7, the boys in the Leeds sample were more variable than the girls, but the difference was not significant.

10. On Gray's Oral Reading Test at age 7, the girls in the Jackson sample were more variable than the boys, but the difference was not significant.

11. The overlap of the distributions of the boys and girls within the national samples was large at each age on each test.

Discussion

The above inventory of the detailed results sets the stage for a discussion of the trends revealed. These trends will now be identified and discussed in relation to previous work in the field. Consideration will also be given at this time to the implications of the results. The presentation which follows is divided into five parts: (1) comparisons of central tendency of total samples; (2) comparisons of variances of total samples; (3) comparisons of central tendency of boys and girls; (4) comparisons of variances of boys and girls; and (5) comparisons of spelling errors. This is a familiar division by now. In this instance, however, the results of the English and Scottish versions of the investigation will be pooled and treated as a single body of evidence. This is the distillation which was forecast earlier. Consideration will be given first to the comparisons of central tendency involving the total samples. The results obtained at age 7 will serve as a convenient point of departure.

COMPARISONS OF CENTRAL TENDENCY OF TOTAL SAMPLES

At age 7, the mean scores of both the Leeds and West Lothian samples excelled the test norms for American children of the same age and the mean scores of the Pinellas and Jackson samples in virtually every comparison. This finding seems almost certainly to reflect the earlier age at which Leeds and West Lothian children begin their primary education. It is probably no less an accident that similar results have been obtained in previous studies of a comparable nature. These include a study by Taylor (1950) based on the performance of a group of Scottish children from Fife and Edinburgh on the Metropolitan Readiness Test. Taylor's subjects had a mean age of 6 years and 3 months and a mean IQ of about 100 on the Stanford-Binet Test. They achieved a mean age score of 7 years and 5 months on the Metropolitan Readiness Test. The average American child of the same age would presumably have an achievement age of 6 years and 3 months on this test. The average child in Taylor's sample, therefore, was about a year ahead of the average American child at this age. Taylor attributed her finding to the earlier age of introduction to reading of Scottish children and concluded that readiness can be affected by training and is not solely a matter of maturation.

In another study (Pringle and Neale, 1957), the performance of a group of English children on the Schonell Graded Reading Vocabulary Test and the Schonell Silent Reading Test was compared with their performance on the Word Recognition and Paragraph Reading sections of the Gates Primary Reading Test. These subjects were in their 1st year of junior school. They had a mean age near 8 years and 2 months and a mean IQ of approximately 104 on the Moray House Picture Intelligence Test. They achieved mean age scores as follows on the reading tests: 8 years and 2 months on the Schonell Reading Vocabulary Test; 8 years and 10 months on the Gates Word Recognition Test; 8 years and 3 months on the Schonell Silent Reading Test; and 8 years and 7 months on the Gates Paragraph Reading Test. The Schonell tests are standardized on English children, while the Gates tests are standardized on American children. The fact that the Gates tests did not set as high a standard as the Schonell tests suggests once again that English children read better sooner than American children, although it should be noted that the difference between standards was larger on the word recognition test than on the paragraph reading test.

Still other studies have compared groups of American children who have been introduced to formal reading at different ages. The studies of Morphett and Washburne (1940), Bradley (1956), and Ilika (1963) are particularly relevant, since they were designed to assess not only the immediate but also the long-term effects of the difference in the age of beginning instruction. These studies serve further to demonstrate that children who receive instruction in advance of others gain an initial advantage, but the results of the follow-up indicate that this advantage is not maintained at the later ages. A similar trend was observed in some of the comparisons in the present investigation, particularly on the paragraph meaning test. The differences which were found in favor of the Leeds and West Lothian samples at age 7 in paragraph reading were not sustained at the later ages. In fact, in the comparisons at age 14 on this test, the mean score of the West Lothian sample dropped significantly below the norm for American children of the same age and the mean score of the Pinellas sample. The mean paragraph meaning score of the Leeds sample likewise fell significantly below that of the Pinellas sample at this age, but remained slightly above the test norm at the same age as the sample. However, the difference in relation to the norm was no longer significant.

Evidence of an age trend on the word meaning test was largely limited to the West Lothian comparisons with American children. The comparison of the West Lothian samples with the American norms on this test produced significant differences in favor of the samples at all ages. The evidence of an age trend consisted of the fact that these differences became smaller with advance in age. The comparison of the West Lothian and Pinellas samples disclosed a similar trend. At age 14, the mean word meaning score of the West Lothian sample actually dropped below that of the Pinellas sample, although the difference was not significant. The comparison of the Leeds samples with the American norms on the word meaning test also yielded significant differences in favor of the samples at all ages, but these differences did not diminish with age. Moreover, the Leeds samples held a significant advantage over the Pinellas samples at both ages 11 and 14 on this test. The difference at age 14 was smaller than at age 11, but otherwise an age trend in the Leeds comparisons with American children on the word meaning test did not develop.

Both the Leeds and West Lothian samples maintained a significant advantage on the spelling test at all ages. This was true both of the comparisons with the test norms and with the mean scores of the Jackson samples. The differences in favor of the Leeds samples in relation to the norms decreased progressively with advance in age, while evidence of an age trend in the West Lothian comparisons with the norms was limited to a reduction in point spread at age 14. The West Lothian samples achieved their largest advantage at age 11, but even the difference at age 14 remained large. No evidence of an age trend was found in the comparisons of the Leeds and West Lothian samples with the Jackson samples on the spelling test. However, these comparisons were complicated by the fact that the Jackson samples themselves lost ground in ability to spell with advance in age. The Leeds and West Lothian samples would naturally tend to gain from any such regression on the part of the Jackson samples.

Both the Leeds and West Lothian samples lost their initial advantage on the handwriting scale as age increased. In fact, the handwriting of the West Lothian samples tended to deteriorate after age 11. Wills (1938) has reported similar results based on a study of the handwriting of groups of Scottish children aged 8, 9, 10, 11, and 12. As she stated (ibid., p. 234), "Quality shows a slight advance yearly until the age of 10 years, after which there is a decrease and it becomes less than that of the youngest age group." Precisely the same trend was observed with the Scottish samples in the present investigation. The quality of handwriting of the West Lothian samples was not as high on the average at age 14 as it was at either age 7 or 11. The mean ratings of the Jackson samples on the handwriting scale steadily increased with age. The handwriting of the Leeds samples also tended to improve with age, but the change from age 11 to 14 was small. The mean ratings of the Jackson samples exceeded those of the Leeds samples at both ages 11 and 14, although differences were not significant.

The hypothesis that an accelerated program of instruction will produce only temporary gains of limited size is not completely supported by the results of the present investigation. While the results on the paragraph meaning test and the handwriting scale lend support to the hypothesis, the same cannot be said with equal assurance for the results on the word meaning and spelling tests. Both the Leeds and West Lothian samples retained considerable strength on these tests at all ages and evidence of an erosion of the initial advantage with age was more limited and spotty in nature, but here again there is precedence. Similar results were obtained in a study by Scholl (1960), in which the Paragraph Meaning, Word Meaning, and Spelling subtests of the Stanford Achievement battery were administered to groups of English children from Burton-upon-Trent. The groups were aged 7, 9, 11, and 13. These samples tended to perform above the norms on the word meaning and spelling tests, but below the norms on the paragraph meaning test, except at age 7, where the sample enjoyed a small advantage over the norm on the paragraph meaning test as well. At the later ages, however, the Burton samples remained stronger in word meaning and spelling than in paragraph meaning, just as did the Leeds and West Lothian samples in the present investigation.

Scholl later conducted a similar study based on the performance of groups of American children on achievement tests standardized on English children, an investigation made possible by a grant from the Horace H. Rackham School of Graduate Studies at The University of Michigan. Turnabout is fair play! The American samples were groups of Jackson children aged 7, 9, and 11. The mean IQ of each group on the Lorge-Thorndike Group Intelligence Test was approximately 105. The achievement tests used with these subjects were the Survey Reading Tests of the National Foundation for Educational Research in England and Wales and the Schonell Spelling Test. The data have not been fully analyzed, but the results on the spelling test are reported in Table 189. The samples fall significantly below the English norms at all ages. This is further evidence of the high standards of spelling which English children achieve, as compared with Jackson children.

TABLE 189

COMPARISON OF JACKSON SAMPLES WITH ENGLISH NORMS ON SCHONELL SPELLING TEST

Age	No.	Mean	s	Norm	Difference	t
7	191	22.78	10.71	28.89	-6.11	7.88**
9	173	43.80	13.63	49.47	-5.67	5.45**
11	162	61.05	12.44	70.12	-9.07	9.26**

Another related study is that of MacGregor (1934), in which he tested virtually all 11-year-olds in Fife, Scotland, using the Public School Achievement Test, a test standardized in the United States. These children excelled the American norm by 29 months in spelling. This was their strongest area of achievement. Although comparisons in the present investigation were based on raw scores, it may be reported that conversion of the mean raw score of the West Lothian sample at age 11 on the Metropolitan Spelling Test into an age equivalent yields an advantage of 26 months for the West Lothian sample. MacGregor's subjects excelled the American norm by 5 months in reading. A difference of 4 months was found in favor of the West Lothian sample at age 11 on the Stanford Paragraph Meaning Test by the same process of converting the mean raw score into an age equivalent. Thus, both the Fife and West Lothian samples at this age were much stronger in spelling than in reading. The agreement of results is remarkable, especially after all these years.

MacGregor concluded that part of the Scottish advantage in spelling was due to beginning instruction at an earlier age and part was due to efficiency of instruction. He attributed the failure of his subjects to demonstrate a similar superiority in reading to the proposition that less attention is given to reading than to spelling in Scottish schools. An equally good judgment is that American schools place greater emphasis on reading than on spelling.

This discourse would not be complete without a review of a study by Vernon, O'Gorman, and McLellan (1955), in which the school attainments of groups of English and Scottish children were compared. This study is of interest from the standpoint that Scottish education tends to remain rather formal and academic even by English standards. "It is generally agreed," wrote the investigators (ibid., p. 195), "that Scottish primary education tends to be more formal than English, involving the earlier introduction of, and more thorough drilling in, the three R's, and a greater use of corporal punishment." The object was to ascertain whether Scottish methods, insofar as they may differ from English practices, actually produce better results, and whether the advantage, if any, is lasting. The investigation was limited to the approximate ages 8, 11, and 14. The English samples were obtained from a market town with a population of approximately 14,000, located in one of the Home counties. A seaside town with a population of about 10,000 served as the source of the Scottish samples. Both towns were described as having light industry with a considerable element of commuting business men. Almost the complete populations at the ages concerned were tested with a battery of mental and achievement tests. Differences between mean IQ's, while small, favored the English samples at all ages. The results on the achievement tests were as follows: At age 8, the Scottish sample held a fairly large advantage in word recognition, spelling, and arithmetic, but not in reading comprehension. At age 11, the Scottish sample retained a substantial advantage in spelling and mechanical arithmetic. At age 14, a large difference in favor of the Scottish sample was found only in spelling. At no age was a large difference found either way in reading comprehension.

The above results suggest that even the differences between English and Scottish methods may give Scottish children an initial advantage, especially in those areas of achievement which lend themselves to drill. The finding that only the Scottish advantage in spelling survived the test of time is of double interest, since spelling proved to be a strong suit of the Scottish samples in our own investigation. Although the mean scores of both the Leeds and West Lothian samples were significantly above the norms on the Metropolitan Spelling Test at all ages, the West Lothian samples enjoyed the larger advantage in these comparisons. Moreover, the differences in favor of the Leeds samples decreased with age, while at no age was the West Lothian advantage reduced to the margin of Leeds children.

What the evidence suggests is that instruction may play a more vital role in learning to spell than in learning to read. This judgment is supported by Schonell (1956), who reports that school experiences have a greater influence on spelling achievement than do such factors as intelligence and maturity. He further suggests that this influence is stronger in spelling than in other areas of achievement. The superiority which the West Lothian samples, in particular, demonstrated in the comparisons with the norms on the spelling test tends to support this conclusion. This was true both of the comparisons with the norms at the same ages as the samples and at 12 months above the mean ages of the samples. Even though the latter comparisons gave the American children represented by the norms the benefit of an additional year of maturity, the mean scores of the West Lothian samples remained above the norms at all ages. While the difference at age 14 was no longer significant, it should be pointed out that by this age American children may also have the benefit of a longer period of instruction, a result of the fact that formal spelling instruction in Scotland (and in England) customarily ends when children complete primary school, while in the United States spelling instruction commonly extends into grades 7 and 8. This longer period of instruction may enable American children to begin to catch up, apart from any question of maturity.

Reading conformed more closely to the developmental trends expected, as evidenced by the results on the paragraph meaning test. The differences which were found in favor of the Leeds and West Lothian samples at age 7 on this test were not maintained at the later ages, either in the comparisons with the norms at the same ages as the samples or in the comparisons with the Pinellas samples. Moreover, both the Leeds and West Lothian samples dropped significantly below the norms at all ages, when the norms on the paragraph meaning test were computed at 12 months above the mean ages of the samples. Time irons out the course of learning to read, probably because of the amount of reading that children do in general. The practice that they receive during the period of formal reading instruction is only a small part of it. Reading cuts across the entire academic curriculum. In addition, there is the reading which is done outside of school. Children have endless occasions to practice their reading, with associated improvement in skill. Thus, once children have mastered the technique of reading, they tend to improve on their own. The progress which results is not limited by a lack of instruction, but by individual factors.

So while the evidence suggests that the advantage of an early start can be maintained in spelling, the finding that the same may not be true of reading leads to the question of whether it is worthwhile to advance the age of beginning reading just to capture the gain in spelling. Words cannot be spelled until they are read. Furthermore, the evidence indicates that Scottish if not English children make spelling gains beyond those attributable to the earlier age of beginning instruction. Other reasons, therefore, must be found to account for these gains. The attention given to phonics in English and Scottish schools may not be the least of these reasons. The application of phonics to unfamiliar words also promotes growth in reading vocabulary, another area in which the Leeds and West Lothian samples excelled. The value of phonics in relation to reading comprehension is less positive.

The finding that both the Leeds and West Lothian samples tended to lose ground to the Jackson samples on the handwriting scale with advance in age may reflect a difference in the amount of attention given to handwriting in the later grades. Leeds and West Lothian children receive little if any formal instruction in handwriting after they leave primary school, while in Jackson the handwriting program extends into the secondary grades. The implication is that the quality of handwriting is not likely to improve after children enter secondary school, unless instruction is continued. In fact, without further instruction, the quality of handwriting may worsen in secondary school, as evidenced by the results obtained with the West Lothian samples on the handwriting scale. In this respect, handwriting is similar to spelling. Both lean somewhat more heavily on the formal instructional program than does reading.

An analysis cannot be made of age trends on the test of oral reading, since this test was administered only at age 7. At this age, however, the mean scores of both the Leeds and West Lothian samples on the oral reading test were significantly above the test norms for American children of the same age and the mean scores of the Jackson samples. This appears to be another example of the initial advantage that the Leeds and West Lothian samples gained by starting their primary education at 5 rather than 6, although the stress placed on oral reading during the early years in school and the attention given to phonics in beginning reading constitute additional factors. A supplementary comparison of the oral reading errors of the samples is enlightening in this connection, especially with respect to errors in the category of words aided. These are words which stumped the child and which the examiner had to supply to enable the child to get on with the test. Tables 190 and 191 show that words aided comprised a significantly higher percentage of the total errors of the Jackson samples than of the Leeds and West Lothian samples. These

TABLE 190

COMPARISON OF PERCENTAGES OF WORDS AIDED IN RELATION TO TOTAL ERRORS OF JACKSON AND LEEDS SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Jackson		Leeds		Difference	t
No.	Percent	No.	Percent		
215/430	50.00	144/397	36.27	13.73	3.98**

TABLE 191

COMPARISON OF PERCENTAGES OF WORDS AIDED IN RELATION TO TOTAL ERRORS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7 ON GRAY'S ORAL READING TEST

Jackson		West Lothian		Difference	t
No.	Percent	No.	Percent		
104/351	29.63	47/393	11.96	17.67	5.99**

results suggest that the Leeds and West Lothian samples had considerably less difficulty with unfamiliar words than did the Jackson samples. What this probably means is that the Leeds and West Lothian samples were better equipped to apply phonics to unfamiliar words than were the Jackson samples.

The comparisons of the Leeds and West Lothian samples with the norms on the oral reading test at 12 months above the mean ages of the samples cancelled the differences found in favor of the samples when the comparisons with the norms were made at the same ages as the samples, but they did not give the American children represented by the norms any particular advantage. What these results suggest is that Leeds and West

Lothian methods were just as effective at 5 as Jackson methods were at 6, insofar as the teaching of oral reading was concerned. It should be noted, however, that Gray's Oral Reading Test does not include a test of comprehension. The score is based simply on the rate and accuracy of oral reading. These are aspects of reading that can rather readily be managed on the basis of propaedeutic instruction. Maturity may play a larger role in relation to reading comprehension. This is the import of the results which were obtained when the Leeds and West Lothian samples were compared with the norms on the paragraph meaning test at age plus 12 months. It may be recalled that these comparisons dropped both the Leeds and West Lothian samples significantly below the norms at all ages, with the American children represented by the norms gaining their largest advantage at age 7, where maturity differences count more than at the later ages.

There is in England at the moment some sentiment for changing the age of entrance to infant school from 5 to 6 and the school leaving age from 15 to 16. Under this proposal, children might still be admitted to reception classes at 5, but for half-day sessions only. This is what the kindergarten often amounts to in the United States. Serious school begins in the 1st grade. The results of the comparisons of the Leeds and West Lothian samples with the norms at age plus 12 months suggest that little would be lost by such a change. These comparisons erased the initial advantage which the Leeds and West Lothian samples gained at age 7 from the comparisons at the same ages as the samples on all but the spelling test. Moreover, they gave the American children represented by the norms a distinct advantage at all ages on the paragraph meaning test. Even the results on the spelling test seem to reflect more a difference in methods of instruction than a difference in the age of beginning instruction. It is not unlikely that the same results could be obtained by extending spelling instruction at the other end. It is hard to believe that greater gains can be achieved in any area of school learning by beginning instruction at 5 rather than 6. The results on the paragraph meaning test suggest that the earlier start merely produces an initial hot-housing effect which levels off as the children grow older. Nothing is gained in the long run. For the same reason, the efforts currently being made in the United States to speed up learning to read must be viewed with skepticism. All of these innovations have yet to stand the test of time.

School leavers pose a problem both in England and Scotland and in the United States. However, a much larger percentage of English and Scottish children than of American children leave school after attendance is no longer required by law. Close to 70% of English and Scottish children leave school at the age of 15. Most of these are from secondary modern schools (in England) and from junior secondary schools (in Scotland), with courses lasting to the school leaving age of 15. In the United States, less than 25% drop out at the school leaving age of 16. Most American children remain enrolled until they finish high school. English children assigned to secondary modern schools and Scottish children allocated to junior secondary schools do not have the same option. In effect, they are forced out of school at the age of 15, since their courses end when they reach that age. This appears to be by design.

The Leeds and West Lothian samples at age 14 included a substantial fraction of students enrolled in secondary modern and junior secondary courses. It has been suggested that one reason why the Leeds and West Lothian samples at this age fell down on the paragraph meaning test and to a lesser extent on the word meaning test is that the same emphasis is not placed on academic performance in secondary modern and junior secondary schools as in the grammar schools of England and the senior secondary schools of Scotland. Moreover, students in secondary modern and junior secondary programs know that they will probably leave school at age 15. The teachers also know it. Motivation becomes a problem under these conditions. The Leeds and West Lothian samples at age 14 remained strong in spelling, but this is a skill that was taught earlier before the transfer to secondary school. A Scottish slant on these and other points of the West Lothian comparisons with American children is given in Appendix D.

The results of an analysis of item difficulties on the Stanford Paragraph and Word Meaning Tests are reported in the tables of Appendix E. The percentages of correct responses shown for American children in these tables were obtained through the courtesy of the test publishers. They are based on the performance of the children in the normative groups. On the whole, the tests seemed free of any serious cultural bias. While American children had a substantially higher percentage of correct responses on a few items, Leeds and West Lothian children more than made up for it on other items. There was an item in the word meaning test at age 11, the correct answer to which was thrifty. American children did better on this item than West Lothian children. Thrifty Scots, did you say?

COMPARISONS OF VARIANCES OF TOTAL SAMPLES

At age 7, both the Leeds and West Lothian samples tended to show greater variability than the American samples on all of the achievement tests. This finding can probably be related to the difference in the amount of schooling that the children have had at this age. Those with the longer period of schooling would naturally tend to be more spread out in achievement. The greater variability of Leeds children was especially apparent in this connection, possibly because the Leeds comparisons with American children involved younger age groups. Extent of schooling would loom larger as a factor the younger the children are, provided they are ready for instruction. One way of putting it is that the longer period of schooling would enable more of the children to get "off the ground."

The other principal findings of the comparisons of the variances of the total samples on the achievement tests were as follows:

1. At ages 11 and 14, both the Leeds and West Lothian samples tended to remain more variable than the Pinellas samples on the paragraph meaning test. A consistent pattern of differences between variances was not observed after age 7 on the word meaning test.

2. At ages 11 and 14, the Jackson samples tended to become more variable than the West Lothian samples on the spelling test, while the Leeds samples tended to remain more variable than the Jackson samples in spelling.

3. At ages 11 and 14, the Jackson samples tended to show greater variability than both the Leeds and West Lothian samples on the handwriting scale.

It was hypothesized that the American samples would show the greater variability on the achievement tests. This expectation was based on the premise that methods which are free of the pressure imposed by the accelerated program of English and Scottish schools would tend to maximize differences in achievement which can be attributed to differences in maturity. It is clear, however, that the results did not turn out entirely as expected. On the whole, the Leeds samples tended to be more variable than the American samples, while the West Lothian samples were in general no less variable than the American samples.

A study by Pidgeon (1962) bears reporting in relation to the Leeds comparisons with American children. Pidgeon's study was conducted as a part of a larger investigation concerned with the educational achievement of 13-year-old children in 12 different countries. The countries were Belgium, England, Finland, France, Germany, Israel, Poland, Scotland, Sweden, Switzerland, United States, and Yugoslavia. The tests administered to the samples included non-verbal aptitude, mathematics, reading comprehension, geography, and science. The tests were presented in the language of the home country. Pidgeon's study was concerned with a comparison of the dispersion of the test scores of the national samples.

England had by far the largest dispersion on every test. On the test of reading comprehension, the variability was largest for England, Scotland, and the United States in that order. This finding tends to support the outcome of the present investigation on the paragraph meaning test.

Pidgeon relates his findings to the English practice of streaming children into separate classes according to their capacity and attainments. Such streams are found even in junior schools, where numbers permit. It is sometimes alleged, as Pidgeon points out (*ibid.*, p. 57), "that one of the results of streaming is that the brighter children make more progress than they would otherwise achieve, and also that the duller children, when assigned to a 'C' stream, become more backward, partly as a result of poor morale, and partly because there is a tendency in some schools for the more experienced teachers to be put in charge of the abler streams." There is also the possibility, as Pidgeon recognizes, that "A" stream teachers may expect more of their pupils than "C" stream teachers, with the result that "A" stream pupils are exposed to a much more advanced level of work than "C" stream pupils. Pidgeon cites a study by Daniels (1961), in which the performances of pupils in two unstreamed primary schools were compared with those of pupils in two streamed primary schools. The schools were large and they were located in the same type of neighborhood. The dispersion of test scores was in general larger in the streamed schools. This finding seems to offer direct evidence that the practice of streaming as found in England tends to increase individual differences in achievement, although Pidgeon emphasized that additional evidence was needed before generalized conclusions could be drawn.

In the United States, children are typically grouped according to grade. Classes, for the most part, are heterogeneous. The aim of the teacher is to enable as many pupils as possible to complete the work of the grade successfully. Under these conditions, the most talented pupils are not likely to be overly extended. They will succeed anyway. Thus, the teacher may devote her main effort to the less able. Pidgeon suggests that the net effect may be to reduce the variability in achievement. As he puts it (ibid., p. 80), "while it is possible that the brighter children within such a group will not be unduly extended, the duller ones will presumably receive every encouragement to achieve the grade pass and the net results will be a tendency for achievement test scores, if not to cluster around the mean, at least to be relatively unrepresented at the extremes."

Pidgeon also calls attention to the fact that American classes may include repeaters and children who may have skipped grades. These children would probably contribute less to the variation in achievement in the grade in which they are placed than they would to that of their original age groups. In England and Scotland, promotion is based almost exclusively on age, with individual differences met by streaming, where age groups are large.

An examination of the distributions of the Pinellas and Leeds samples on the paragraph and word meaning tests and of the Jackson and Leeds samples on the spelling test lends support to Pidgeon's analysis.[1] The Leeds distributions were flatter with less concentration of scores around the mean, particularly at ages 7 and 11, where the Leeds samples were significantly more variable than the American samples on all of these tests. The greater variability of the Leeds samples on the spelling test sprang mainly from the higher number of scores in the upper range. The Leeds distributions on the paragraph and word meaning tests revealed a comparatively high representation of scores at both ends of the scale. Leeds children on these tests showed a greater tendency to be either very good or very poor. The Pinellas distributions were more normal in form.

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[1] At the time of this investigation, the Leeds schools concerned were streamed. Since then, a movement to de-stream has set in and it is likely that this process will gradually extend throughout the city.

Scottish schools also practice the system of streaming, although the number of pupils in streamed classes is proportionately smaller in Scotland than in England, because of the comparatively large number of small primary schools in Scotland, in which streaming would not pay. A discrepancy occurs between the results of the Leeds and West Lothian comparisons with Jackson children on the spelling test at ages 11 and 14, where the Jackson samples were significantly more variable than the West Lothian samples. A similar divergence occurs at age 11 on the word meaning test, where the Pinellas sample was significantly more variable than the West Lothian sample. In these particular comparisons, however, the frequency tables show that the West Lothian samples were handicapped by an inadequate test ceiling. The effect was to depress the variability of the West Lothian samples, as a consequence of which a true measure of the difference between the variances of the samples was not obtained. Apart from these equivocal results, there was no evidence that the American samples were any more variable on the achievement tests than even the West Lothian samples, except as the Jackson samples tended to be more variable than both the Leeds and West Lothian samples on the handwriting scale, expecially at the later ages. It may be that the acceptance by American schools of individuality of style tends also to exaggerate individual differences in the quality of handwriting. The handwriting of both the Leeds and West Lothian samples tended to be more uniform in style than that of the Jackson samples. This was especially true of the handwriting of the West Lothian samples.

Kemp (1957) studied the variability in attainment of pupils in their last year of junior school. The source of subjects consisted of 50 mixed junior schools in London. The largest spread was found in the schools exerting the least formal pressure. It may be, therefore, that there still is something to our original hypothesis, but a pure test could not be made of it in the present investigation because of the intrusion of streaming. Problems of test ceiling also interfered with certain of the comparisons.

COMPARISONS OF CENTRAL TENDENCY OF BOYS AND GIRLS

At age 7, the mean scores of the girls excelled the mean scores of the boys in every comparison on all tests, although differences were not always significant. However, a sign test would leave no doubt of the outcome. This finding conforms to the well established fact that girls tend to get off to a faster start than boys in all language activities. In general, the differences in favor of the girls at this age were largest on the paragraph meaning test, where the mean scores of the girls were significantly above those of the boys in all of the comparisons concerned.

The girls excelled the boys "across the board" on the spelling test, with some evidence that the differences in favor of the girls increased with age, especially in the case of the Jackson samples. In general, the Jackson samples produced the largest differences in favor of the girls on this test, although the girls excelled the boys in spelling at all ages in every national sample. Additional evidence of the superiority of girls in spelling is reported in Table 192. This comparison utilizes data collected in the previously discussed work of Scholl, in which the Schonell Spelling Test was administered to groups of Jackson children. The mean

TABLE 192

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES ON SCHONELL SPELLING TEST

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	97	20.52	9.89	94	25.11	11.09	-4.59	3.02**
9	93	42.06	14.06	80	45.81	12.92	-3.75	1.82
11	82	58.84	11.38	80	63.31	13.15	-4.47	2.30*

scores of the girls are above those of the boys at all ages. Differences are significant at ages 7 and 11. Other studies which have demonstrated the superiority of girls in spelling include those of MacGregor (1934) and Vernon, O'Gorman, and McLellan (1955), also cited earlier in this discussion.

At ages 11 and 14, the girls also tended to retain an advantage on the handwriting scale, except for the West Lothian samples, where the differences between the mean handwriting ratings of the boys and girls were negligible at the later ages. The Jackson samples tended to show the largest differences in favor of the girls on the handwriting scale, just as on the spelling test. The superiority of Jackson girls on both the handwriting scale and spelling test was most pronounced at age 14. The tendency of differences in favor of American girls in quality of handwriting and spelling to be largest at the later ages has previously been noted by Lincoln (1927).

The initial advantage of the girls on the paragraph and word meaning tests tended to evaporate with age. In fact, the mean scores of the girls in the West Lothian samples on these tests dropped significantly below those of the boys at ages 11 and 14. Table 193 and 194 offer additional comparisons of boys and girls in paragraph reading and word meaning.

TABLE 193

COMPARISON OF BOYS AND GIRLS IN KALAMAZOO SAMPLES ON STANFORD PARAGRAPH MEANING TEST

Grade	No.	Boys		Girls		Difference	t
		Mean	s	Mean	s		
2	90	29.68	10.68	32.67	9.89	-2.99	1.97*
6	90	34.36	8.86	32.70	8.92	1.66	1.25
8	90	36.08	6.61	36.26	5.77	-0.18	0.19

TABLE 194

COMPARISON OF BOYS AND GIRLS IN KALAMAZOO SAMPLES ON STANFORD WORD MEANING TEST

Grade	No.	Boys		Girls		Difference	t
		Mean	s	Mean	s		
2	90	24.54	8.14	27.03	7.89	-2.49	2.08*
6	90	37.24	9.11	36.53	8.57	0.71	0.54
8	90	35.52	8.07	36.33	7.46	-0.81	0.70

These results are based on scores obtained by agreement with the Kalamazoo, Michigan, Public Schools, where the same forms of the tests as were used in the project investigation had been administered in the past as a part of the school system's own annual testing program. The testing in this case was conducted during the spring of 1962. The samples were identified from records already on file. Ninety pairs of boys and girls were involved from each of grades 2, 6, and 8. The boy and girl comprising each pair were selected from the same school, they were of the same chronological age to the month, and their IQ's did not vary by more than two points. These are rather rigorous conditions, but the results still yield an early advantage to the girls, which once again was not maintained in the later grades.

Table 195 compares boys and girls in groups of Jackson children on the Survey Reading Tests of the National Foundation for Educational Research in England and Wales. This is another comparison made possible by Scholl's research, in which tests standardized in England were used with Jackson children. The differences shown in the table favor the girls at all ages, but only the difference at age 7 is significant. It is remarkable how well the evidence agrees as demonstrating the same trend. The conclusion to be drawn is that girls tend to surpass boys in reading achievement during the primary grades, but that they lose their advantage

TABLE 195

COMPARISON OF BOYS AND GIRLS IN JACKSON SAMPLES ON SURVEY READING TESTS OF THE NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH IN ENGLAND AND WALES

Age	Boys			Girls			Difference	t
	No.	Mean	s	No.	Mean	s		
7	97	17.91	6.57	94	20.70	5.84	-2.79	3.10**
9	93	21.83	10.36	80	22.25	10.38	-0.42	0.27
11	82	30.40	9.77	80	31.21	10.67	-0.81	0.51

during the intermediate grades. Others have arrived at the same conclusion (Heilman, 1961).

The finding that the girls excelled the boys on all tests at age 7 can perhaps best be explained by the fact that girls tend to mature more rapidly than boys, as a consequence of which girls reach a state of readiness for language learning sooner. There is no doubt that girls mature physically at a more rapid rate than do boys, and it has been demonstrated that age of learning to read is related to differences in physical growth (Anderson and Hughes, 1955). The same factor could apply to age of learning to write and spell.

It was hypothesized that the American samples would show the largest differences in favor of the girls on the achievement tests. The belief was that the attention given to readiness in American schools would tend to maximize differences which could be attributed to differences in maturity. This hypothesis was not supported by the results at age 7, where West Lothian tended to yield the largest differences in favor of the girls, everything considered. For example, a significant difference in favor of the girls on the oral reading test was found only in West Lothian.

The best interpretation of the results on the paragraph and word meaning tests is that time irons out the course of learning to read of boys and girls. This is to say that boys overcome their initial lag with additional maturity. This interpretation is consistent with the explanation which was applied to the developmental trend observed on these tests in relation to the Leeds and West Lothian comparisons with American children, except that there the additional maturity which comes with age seemed to wipe out the initial disadvantage of less instruction.

Why the mean scores of the girls in the West Lothian samples on the paragraph and word meaning tests dropped significantly below those of the boys at ages 11 and 14 is not clear. Intelligence apparently was not a factor, since significant differences were not found between the mean IQ's of the boys and girls in the West Lothian samples at these ages. The fact that the comparisons of the mean scores of the boys and girls in the other national samples on these tests produced no significant differences at the later ages tends to rule out the possibility that the test content may have favored the boys. Cultural expectations also seem to be eliminated as a factor, since similar differences in favor of the boys were not found in the Leeds samples. Although statistically significant, the differences found in favor of the boys in the West Lothian samples on the paragraph and word meaning tests at ages 11 and 14 were not large. This may be another example where numbers sharpen statistical tools to the point that rather trivial differences become statistically significant without carrying much other meaning. MacGregor's investigation (1934) of Fife children at age 11 also yielded a small difference in favor of boys on an American reading test. However, in another investigation of Scottish children at age 10, girls were found to excel boys in both English usage and reading comprehension, although the difference in favor of the girls was more marked in English usage than in reading comprehension (Scottish Council for Research in Education, 1963).

The results of the comparisons of the boys and girls on the handwriting scale and spelling test may be related to the possibility that formal instruction plays a larger role in learning to write and spell than in learning to read. Children tend to gain ground on their own in learning to read, while they may not advance at the same rate in learning to write and spell without a good bit of formal instruction. The finding that girls tended to excel boys at all ages on the handwriting scale and spelling test further suggests that girls may gain more from formal instruction in these areas than do boys, possibly because of the greater docility of girls, expressed in a willingness to cooperate with the teacher. Boys may be less inclined to conform, simply to please the teacher. They might not consider it manly. Without some such variable, it would be difficult to explain why girls remain superior in handwriting and spelling which have already been observed to be more influenced by school experiences than by such factors as intelligence and maturation.

COMPARISONS OF VARIANCES OF BOYS AND GIRLS

The boys tended to be more variable than the girls on the achievement tests, especially where significant differences were concerned. The greater variability of the boys was most evident on the spelling test. The frequency tables indicate that this situation was largely the outcome of a wider scattering of boys in the lower ranges. Boys outnumbered girls among the "hard core" of poorest spellers at every age in all national samples. The poorest spellers were the most apt to be boys in the case of the West Lothian samples. Strangely or not, MacGregor (1934) found no significant differences between the variability of the boys and girls in his Fife sample in spelling achievement, although he did find that girls were better spellers on the average.

An exception to the general trend occurred at age 7 in the case of the subjects who were involved in the Leeds comparisons with American children. If anything, the girls in these samples tended to be more variable than the boys on the achievement tests. The younger ages of these subjects may be a factor here. The greater readiness of the girls would enable more of them to get "off the ground," to resort to an expression that we have used before. Readiness would be less of a factor in the case of older children.

The girls also tended to show somewhat greater variability than the boys on the handwriting scale, expecially at the later ages. Otherwise, the boys tended to be more variable overall. For the most part, however, differences were small and they permit no general nor firm conclusions. Such has been the judgment of others who have compared the variability of boys and girls on achievement tests (Lincoln, 1927). Differences vary with the test and with age, and not always in a consistent fashion. The classic doctrine of the greater variability of the male is all right as far as it goes, but not all of the evidence supports it. What is known is that language problems of all sorts occur more frequently among boys than among girls. This we demonstrated on the spelling test, if not on the other tests.

COMPARISONS OF SPELLING ERRORS

The comparisons of the spelling errors revealed that the percentage of the most common misspellings classified as phonetic was higher for the Leeds and West Lothian samples than for the Jackson samples at all ages, although differences decreased with age in the West Lothian comparisons with Jackson children. Moreover, on the tests of readability of misspellings, significantly higher scores were made on the misspellings of Leeds and West Lothian children than of Jackson children at all ages.

The above findings demonstrate a greater tendency on the part of Leeds and West Lothian children than of Jackson children to apply phonics to spelling, a reflection perhaps of a difference between what the children have been taught in school. English and Scottish methods of teaching reading and spelling tend to incorporate phonics from the beginning, while American methods may place somewhat more emphasis on visual approaches to reading and spelling. More important, however, is the relation of phonics to spelling. It has previously been demonstrated that Leeds and West Lothian children spell well by American standards. The evidence that their misspellings are characterized by a high frequency of phonetic errors may be interpreted to mean that they use the same methods of attack when they spell words correctly. It is difficult to escape the conclusion, therefore, that part of the secret of their success in spelling involves their familiarity with phonics.

The very fact, however, that so many of the errors of all samples were classified as phonetic misspellings indicates that phonetic spelling is not an unmixed blessing. The problem here is that there is far from a one-to-one relationship between letter and sound in English spelling. Different signs may be used to represent the same sound or the same sign may be used to represent different sounds. As a consequence, spelling words the way they sound not uncommonly leads to error. The records at age 14, for example, included the following phonetic misspellings for the word physician alone: phisision, phisition, phisishen, ficision, physijan, physition, physisian, fisision, fisishon, phycision, and physishian. Phonetic misspellings of other words included vaycayshon, fownten, soulger, yousyoual, disapoynted, pashents, asosheate, straytened, and skedjual. These additional examples are offered to illustrate that phonetic mispellings are likely to make sense, even though they may look strange. Examples of nonphonetic errors included nigth, bakest, garnde, worng, usaul, alegbra, and capitacy. While such errors do not conform to pronunciation, they may look familiar, and sometimes you can tell at a glance what words were intended. Too often, however, visual misspellings are so far off that you could never tell what words were intended (Anderson, 1962).

The analysis of the spelling records included a comparison of the frequency with which the Jackson and West Lothian samples misspelled the words of the spelling lists. This comparison was limited to the Jackson and West Lothian samples, since it was felt that a similar comparison of Jackson and Leeds children would add nothing different. The relevant tables appear in Appendix F. These results shed additional light on the differences between the spelling habits of the samples. At age 7, for example, a significantly higher proportion of the total errors of Jackson children fell on the words bread, short, send, and ran than did those of West Lothian children. It should be noted that the last three of these words lend themselves rather literally to a phonetic spelling. The same is not so true of bread, the obvious phonetic spelling of which is bred. West Lothian children emerged from this comparison with a significantly higher fraction of their total errors on the words light, night, her, cake, ball, good, came, and cow. These words are less strictly phonetic in nature. Such words would naturally tend to pose a problem to children who resort to a phonetic attack. The interesting part of it is that Jackson children frequently tripped on words that are open to a literal phonetic spelling. The implication is that West Lothian children tended to spell somewhat more by ear than did Jackson children, at least at age 7. The differences were not as pronounced at the later ages, where the misspellings of Jackson children began to show a somewhat greater application of phonics.

Phonetic renditions of mispronunciations compound the problem of phonetic misspelling. Errors in this category consist of the omission, addition, and substitution of sounds. Examples from the present investigation include such misspellings as intresting for interesting, atheletics for athletics, algerbra for algebra, and unanamous for unanimous. Accurate pronunciation of the word would remove one of the pitfalls of phonetic spelling. A common misspelling in the Leeds and West Lothian records at age 14 was shedual for schedule, probably because shedual more nearly conforms to the English and Scottish way of pronouncing the word.

Despite the hazards of phonetic spelling, the advantages of applying phonics to spelling seem to outweigh the disadvantages. Otherwise, it would be difficult to reconcile the superiority which the Leeds and West Lothian samples achieved on the spelling tests with the outcome of the comparisons of the spelling errors. Other studies have no less demonstrated that phonics is of considerable benefit to spelling (Horn, 1960). In fact, there is some evidence that phonics is more beneficial to spelling than to reading, even when taught in connection with the reading program (Beltramo, 1954). A similar construction could be placed on the results of the present investigation.

Downing and Gardner (1962) report success in England with an augmented Roman alphabet designed to remove the complexity of the traditional spelling of English. Only time will tell to what extent this development will catch on.

Among the odds and ends was the finding that the word vacation was comparatively difficult for the Leeds and West Lothian samples at age 11, where the word appeared in the spelling list. After several stabs at vacation, one of the subjects in the Leeds sample at age 11 settled for holiday, which is the word that English and Scottish people customarily use to express the meaning. Liquor was a comparatively difficult word for the Leeds and West Lothian samples at age 14, probably for the same reason. They are likely to call it spirits. The spelling records were a constant source of amusement to the assistants in research who scored the tests. For example, one of the children in the West Lothian sample at age 7 spelled pencil as SOVEREIGN. What he had done was to copy the brand-name on his pencil, right down to printing it in capital letters. One of our Scottish collaborators remarked, "That showed good thinking."

Resume of Principal Trends

So that the principal trends disclosed by this investigation will not be lost in the welter of the above discussion, they will be repeated here as a means of bringing this report to a close.

1. At age 7, the mean scores of both the Leeds and West Lothian samples excelled the test norms for American children of the same age and the mean scores of the Pinellas and Jackson samples in virtually all comparisons.

2. At ages 11 and 14, both the Leeds and West Lothian samples tended to maintain an advantage on the spelling and word meaning tests. The advantage remained especially pronounced in spelling.

3. Both the Leeds and West Lothian samples tended to lose ground with advance in age on the paragraph meaning test and the handwriting scale. In fact, at age 14, the West Lothian sample fell significantly below the norm and the mean score of the Pinellas sample on the paragraph meaning test.

4. The comparisons of the Leeds and West Lothian samples with the norms at age plus 12 months erased the initial advantage of the samples on all but the spelling test. In fact, these comparisons dropped the mean paragraph reading scores of both the Leeds and West Lothian samples significantly below the norms at all ages.

5. At age 7, both the Leeds and West Lothian samples tended to show greater variability than the Pinellas and Jackson samples on the achievement tests. This was especially true of the comparisons with Leeds children.

6. At ages 11 and 14, both the Leeds and West Lothian samples tended to remain more variable than the Pinellas samples on the paragraph meaning test. A consistent pattern of differences between variances was not observed after age 7 on the word meaning test.

7. At ages 11 and 14, the Jackson samples tended to become more variable than the West Lothian samples on the spelling test, while the Leeds samples tended to remain more variable than the Jackson samples in spelling.

8. At ages 11 and 14, the Jackson samples tended to show greater variability than both the Leeds and West Lothian samples on the handwriting scale.

9. At age 7, the mean scores of the girls within the national samples excelled the mean scores of the boys in every comparison on all tests, although differences were not always significant.

10. At ages 11 and 14, the mean scores of the girls remained above those of the boys on the spelling test. The girls excelled the boys "across the board" on the spelling test, with some evidence that the differences in favor of the girls increase with age, especially in the case of the Jackson samples.

11. At ages 11 and 14, the girls also tended to retain an advantage on the handwriting scale, except for the West Lothian samples, where the differences between the mean handwriting ratings of the boys and girls were negligible at the later ages.

12. The differences in favor of the girls tended to evaporate with advance in age on the paragraph and word meaning tests. In the West Lothian samples, the differences on these tests actually favored the boys at the later ages.

13. The boys tended to be more variable than the girls on the achievement tests, especially where significant differences were concerned. The greater variability of the boys was most evident on the spelling test.

14. The most common misspellings of both the Leeds and West Lothian samples were more often phonetic in nature than those of the Jackson samples at all ages, although differences decreased with age in the comparisons of the Jackson and West Lothian samples.

15. Evidence was also obtained that the misspellings of both the Leeds and West Lothian samples were more readable than those of the Jackson samples at all ages.

An interpretation of these findings was offered in the discussion. It has previously been indicated that a Scottish slant on the results of the West Lothian comparisons with American children is reported in Appendix D.

APPENDIX A

A COMPARISON OF THE READABILITY OF BEGINNING READING MATERIAL USED BY ENGLISH, SCOTTISH, AND AMERICAN CHILDREN

One of the important elements in any program of beginning reading is the basic material used by the pupils. In the present investigation, the beginning readers used in the schools from which the samples were drawn had been identified and it seemed appropriate to compare the readability of these materials, since there appeared to be a chance that such a comparison might establish another difference between the demands placed on the children.

The initial approach was to apply several formulas used to assess the difficulty of reading material. The Spache (1953) formula was finally selected because it was developed primarily for early elementary material. It utilizes sentence length and percentage of hard words (words not on the Dale list) as the criteria of difficulty.

Two other factors were included as indicators of readability: (1) the number of new words introduced, and (2) the amount of practice (number of repetitions) provided by a series. The more words a youngster is expected to learn, the harder the material; and, conversely, the more repetition, the easier the reading. It is the latter factor which uncovered the most significant difference between the various series used by the samples.

The basic reading materials used in the first two grades were the subject of the analysis. This study was confined to the series used by the school systems from which the samples were chosen. In Leeds, the

Happy Venture and the Janet and John series were the most frequently used. In West Lothian, the Vanguard and the Happy Venture series were identified as the dominant readers. The Scott-Foresman series was used by the American samples. Five books in each series covered the basic reading program through the 2nd year of primary school.

The sample from each book was selected by taking the first sentence on each page. When the books were large, every fourth or fifth page supplied the sentence. In most cases, over 500 words were in each sample. Table 196 and 197 present the results of this analysis of readability. In the first three columns of Table 196, the results of the application of the Spache formula to the sample of material from each book show a remarkable similarity in difficulty. A gradual progression may be seen in the length of the sentences, percentage of hard words, and in the resulting grade level. It is evident that the authors were concerned about the problem of difficulty and developed stories which would not overwhelm young readers.

The remaining portion of Table 196 and all of Table 197 concentrate on the number of words presented by each series. In Table 196 may be found the number of new words introduced by each book. The column showing the number of different words gives an indication of the amount of review provided. Sometimes all of the words which have been taught previously are used again, in which case the number of different words will be the same as the sum of the number of new words. In other cases the review is more limited. The total number of running words is given for each book, and in the last column, the ratio of total words to different words has been computed. This ratio is a rough index of how much repetition is supplied.

Table 197 summarizes the findings on new words, total words, and the ratio of these two measures. It shows that the Vanguard series intro-

TABLE 196

COMPARISON OF VARIOUS BEGINNING READING SERIES ON MEASURES OF READABILITY

Series and Book		Measure of Readability						
		Spache Formula						
		Number of Words in Median Sentence	Percent of Hard Words	Grade Level	Number of New Words	Number of Different Words	Total Number of Words	Ratio of Total Words to Different Words
Preprimer	Vanguard	4	.01	1.40	46	46	301	6.54
	Happy Venture	4	.02	1.40	44	44	553	12.57
	Janet and John	2	.02	1.12	27	27	219	8.11
	Scott-Foresman	4	.01	1.40	58	58	1425	24.57
Primer	Vanguard	5	.04	1.55	123	166	1195	7.20
	Happy Venture	6	.03	1.69	62	106	1280	12.08
	Janet and John	5	.02	1.55	39	66	516	7.82
	Scott-Foresman	5	.06	1.55	100	158	5958	37.71
Book One	Vanguard	11	.07	2.40	257	365	2134	5.85
	Happy Venture	9	.04	2.11	103	185	2626	14.19
	Janet and John	5	.04	1.55	135	201	1364	6.79
	Scott-Foresman	7	.06	1.83	177	335	10841	32.36
Book Two	Vanguard	11	.09	2.40	340	523	5734	10.96
	Happy Venture	11	.05	2.39	210	353	5479	15.52
	Janet and John	8	.04	1.97	196	365	3396	9.30
	Scott-Foresman	11	.07	2.40	229	564	21795	38.64
Book Three	Vanguard	14	.07	2.82	458	833	7025	8.43
	Happy Venture	12	.06	2.54	384	645	10499	16.28
	Janet and John	9	.06	2.11	306	511	5648	11.05
	Scott-Foresman	10	.07	2.25	315	879	22587	25.70

TABLE 197

SUMMARY OF SELECTED MEASURES OF READABILITY FOR BEGINNING READING SERIES

Series	Measure of Readability		
	Total Number of New Words	Total Number of Words	Ratio of Total Words to New Words
Vanguard	1224	16389	13.38
Happy Venture	803	20438	25.45
Janet and John	819	11143	13.60
Scott-Foresman	879	62606	71.22

duces the most words (1224) with the other three series closely grouped (all between 800 and 900 words). The startling thing about this phase of the analysis is the total number of words used in each book and each series. In every case the American series goes far beyond its English and Scottish counterparts. When the total number of words is compared with the new words, it becomes very clear that much more repetition is provided in the American series than in any of the other series included in the study.

Another illustration of the tendency of American basic readers to be more wordy is to be found in Table 198, in which the Janet and John series is compared with an American series known as the Alice and Jerry books. The point of this comparison is that the Janet and John series consists of an adaptation of the Alice and Jerry books. It is clear from Table 198 that the major alteration was to eliminate three quarters of the running words. Difficulty as measured by the Spache formula does not seem to vary in any important manner, nor was much done with the number of new words. It will be noted that no Book III is recorded in the table for the Alice and Jerry series. In this series, Book III is a 3rd grade reader and the analysis was confined to materials through the 2nd grade.

An additional difference between the American and the English and Scottish series can be discovered by examining the books themselves. The latter incorporate special exercises for the application of phonics to reading. These exercises call attention to initial consonant sounds, blends, and other phonetic elements. This kind of training is also provided by the American series, but the actual exercises are to be found in the teachers' manuals rather than in the pupils' books. Thus, the inclusion of this type of instruction is left largely to the teachers' discretion. Laymen looking at the various books could easily assume that phonetic training is lacking in the American series.

TABLE 198

COMPARISON OF THE ALICE AND JERRY SERIES WITH ENGLISH MODIFICATION (JANET AND JOHN SERIES) ON MEASURES OF READABILITY

Series and Book		Measure of Readability						
		Spache Formula			Number of New Words	Number of Different Words	Total Number of Words	Ratio of Total Words to Different Words
		Number of Words in Median Sentence	Percent of Hard Words	Grade Level				
Preprimer	Janet and John	2	.02	1.12	27	27	219	8.11
	Alice and Jerry	4	.00	1.40	67	67	959	14.31
Primer	Janet and John	5	.02	1.55	39	66	516	7.82
	Alice and Jerry	6	.03	1.69	102	180	6960	38.66
Book One	Janet and John	5	.04	1.55	135	201	1364	6.79
	Alice and Jerry	8	.05	1.97	195	442	11700	26.47
Book Two	Janet and John	8	.04	1.97	196	365	3396	9.30
	Alice and Jerry	10	.05	2.25	396	735	24000+	32.65
Book Three	Janet and John	9	.06	2.11	306	511	5648	11.05
	Alice and Jerry							
Totals	Janet and John				819		11143	13.60
	Alice and Jerry				760		43619	57.39

In conclusion, it appears that the major distinction between the beginning reading materials concerns the larger amount of repetition to be found in the American series. This feature should make the American books somewhat easier. It also makes them thicker and probably increases the amount of time spent on the basic readers. The English and Scottish series move at a more rapid pace, a further indication perhaps of the accelerated nature of the program in English and Scottish primary schools.

APPENDIX B

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 7

Check classification: Male____ Female____ Student____ Teacher____

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "0" in the blank space.

1.	rad	red
2.	iowur	our
3.	com	cow
4.	nite	night
5.	hir	her
6.	riad	ride
7.	insied	inside
8.	gandan	garden
9.	sind	send
10.	shs	she
11.	neew	week
12.	littul	little
13.	brd	bread
14.	gowd	good
15.	dall	ball
16.	flie	can
17.	kume	came
18.	shart	short
19.	lite	light
20.	pencile	pencil
21.	rud	ran
22.	cac	cake
23.	riet	write
24.	backet	basket
25.	bekaet	basket
26.	ceam	came
27.	littie	little
28.	reb	red
29.	riade	ride
30.	branb	bread
31.	selt	short
32.	liet	light
33.	aur	our
34.	cint	cow
35.	doog	good
36.	weck	week
37.	ginon	garden
38.	insid	inside
39.	eigth	night
40.	hur	her
41.	pasill	pencil
42.	selld	send
43.	hes	she
44.	rane	ran
45.	han	can
46.	dall	ball
47.	nake	cake
48.	rit	write

APPENDIX B--continued

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 11

Check classification: Male____ Female____ Student____ Teacher____

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "0" in the blank space.

1.	quanities	quantities	24.	hirt	hurt
2.	gimnasaum	gymnasium	25.	waer	wore
3.	wromg	wrong	26.	liy	lie
4.	funay	funny	27.	ljbra	algebra
5.	losed	lost	28.	thoughorly	thoroughly
6.	studey	study	29.	asiccents	assistance
7.	assoseiate	associate	30.	useal	usual
8.	prepaired	prepared	31.	hoom	whom
9.	pricmpual	principal	32.	examineation	examination
10.	disapointed	disappointed	33.	bowt	bowl
11.	curson	cousin	34.	faintain	fountain
12.	athletices	athletics	35.	wepted	swept
13.	liquore	liquor	36.	addmission	admission
14.	solieder	soldier	37.	metearal	material
15.	vaction	vacation	38.	nue	knew
16.	fluterd	flutter	39.	lim	limb
17.	hore	whose	40.	theese	these
18.	strooy	straw	41.	buld	blood
19.	stod	sound	42.	decieve	deceive
20.	bottel	bottle	43.	pipical	pickle
21.	obedente	obedient	44.	pateitence	patience
22.	atitude	attitude	45.	leve	leave
23.	pupms	pumps	46.	haurye	fare

Form 11 - cont'd

47. electricty	electricity	74. alloud	allowed
48. vacantcy	vacancy	75. prepered	prepared
49. alowed	allowed	76. whow	whom
50. intressting	interesting	77. foundtin	fountain
51. exsamination	examination	78. princciple	principal
52. cusen	cousin	79. interessting	interesting
53. sudty	study	80. wour	wore
54. lyime	limb	81. duttle	bottle
55. dutter	flutter	82. pubbs	pumps
56. wronge	wrong	83. hirt	hurt
57. addmichion	admission	84. asistances	assistance
58. piccle	pickle	85. strowe	straw
59. gymnasiam	gymnasium	86. losed	lost
60. quititise	quantities	87. atitude	attitude
61. desive	deceive	88. soond	sound
62. vacashion	vacation	89. vackencly	vacancy
63. athleticks	athletics	90. whoes	whose
64. swepted	swept	91. fagr	fare
65. liy	lie	92. mattrel	material
66. electrisity	electricity	93. neue	knew
67. femnay	funny	94. obedent	obedient
68. blud	blood	95. disepointed	disappointed
69. throughly	thoroughly	96. algubra	algebra
70. assosiate	associate	97. pashont	patience
71. thes	these	98. lickquor	liquor
72. leeve	leave	99. sloider	soldier
73. useal	usual	100.boal	bowl

APPENDIX B--concluded

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 14

Check classification: Male___ Female___ Student___ Teacher___

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "0" in the blank space.

1.	courtice	courteous
2.	wasally	usual
3.	examanation	examination
4.	unamious	unanimous
5.	lim	limb
6.	spceficly	specifically
7.	tholy	thoroughly
8.	chedule	schedule
9.	predidous	prejudice
10.	ridicilous	ridiculous
11.	alloed	allowed
12.	sewpt	swept
13.	suplamentary	supplementary
14.	soilder	soldier
15.	pickel	pickle
16.	liquer	liquor
17.	straigtened	straightened
18.	physitian	physician
19.	cosum	cousin
20.	paitence	patience
21.	analusios	analysis
22.	emphisies	emphasizes
23.	vacency	vacancy
24.	simoltanious	simultaneous
25.	gymnasisum	gymnasium
26.	advantagous	advantageous
27.	aproximently	approximately
28.	mateirl	material
29.	inconvinunce	inconvenience
30.	capicity	capacity
31.	quanity	quantities
32.	comparitivly	comparatively
33.	flakor	flutter
34.	whoses	whose
35.	asistance	assistance
36.	critisiaum	criticism
37.	insignificist	insignificant
38.	proipal	principal
39.	addutted	attitude
40.	pratonage	patronage
41.	algerbra	algebra
42.	addmission	admission
43.	desptad	disappointed
44.	prpared	prepared
45.	faire	fare
46.	athleticss	athletics

Form 14 - cont'd

47.	obient	obedient
48.	assiate	associate
49.	deseve	deceive
50.	elactrace	electricity
51.	schedulal	schedule
52.	insignifigent	insignificant
53.	usall	usual
54.	gymnasian	gymnasium
55.	capasity	capacity
56.	picile	pickle
57.	spacificly	specifically
58.	pregedous	prejudice
59.	comparitively	comparatively
60.	examiation	examination
61.	adventagous	advantageous
62.	approxmatly	approximately
63.	physcian	physician
64.	streatend	straightened
65.	soughter	soldier
66.	atitude	attitude
67.	peapard	prepared
68.	lomb	limb
69.	simotanous	simultaneous
70.	quantitys	quantities
71.	swapit	swept
72.	decieve	deceive
73.	patranage	patronage
74.	faier	fare
75.	liqour	liquor
76.	inconveinence	inconveniance
77.	pations	patience
78.	suplementary	supplementary
79.	admisson	admission
80.	disapointed	disappointed
81.	electricty	electricity
82.	couism	cousin
83.	matereal	material
84.	curtious	courteous
85.	whos	whose
86.	alloud	allowed
87.	rediculous	ridiculous
88.	algibra	algebra
89.	unanamous	unanimous
90.	analice	analysis
91.	athetics	athletics
92.	flater	flutter
93.	asociate	associate
94.	vacanacy	vacancy
95.	critism	criticism
96.	obeant	obedient
97.	empfizez	emphasizes
98.	thosoaly	thoroughly
99.	prinicpal	principal
100.	asistances	assistance

APPENDIX C

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 7

Check classification: Male____ Female____ Student____ Teacher____

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "0" in the blank space.

1.	brd	bread	25.	dall	ball
2.	seu	she	26.	nithg	night
3.	garda	garden	27.	rne	ran
4.	bre	red	28.	insigd	inside
5.	bakt	basket	29.	seh	she
6.	littl	little	30.	gedn	garden
7.	lirt	light	31.	cas	can
8.	bool	ball	32.	braed	bread
9.	pilg	pencil	33.	riad	ride
10.	gud	good	34.	pensill	pencil
11.	cak	cake	35.	westn	week
12.	ron	ran	36.	bascket	basket
13.	inisd	inside	37.	cay	came
14.	rad	ride	38.	sadr	send
15.	rihgt	write	39.	rnd	red
16.	har	her	40.	shart	short
17.	niet	night	41.	kam	cow
18.	ktr	came	42.	kac	cake
19.	oue	our	43.	lattle	little
20.	kaw	cow	44.	lite	light
21.	sanb	send	45.	gooo	good
22.	oan	can	46.	ow	our
23.	srt	short	47.	hr	her
24.	wec	week	48.	rit	write

APPENDIX C--continued

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 11

Check classification: Male____ Female____ Student____ Teacher____

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "O" in the blank space.

1.	soulder	soldier	24.	lossed	lost
2.	pumpts	pumps	25.	amnission	admission
3.	obediet	obedient	26.	funy	funny
4.	stroe	straw	27.	eletricity	electricity
5.	assasiants	assistance	28.	hait	hurt
6.	lev	leave	29.	asoceate	associate
7.	gymnaisem	gymnasium	30.	sownd	sound
8.	houn	whom	31.	meterial	material
9.	liker	liquor	32.	stuidy	study
10.	boold	blood	33.	guatates	quantities
11.	algerbera	algebra	34.	woar	wore
12.	pickeil	pickle	35.	vacence	vacancy
13.	primanel	principal	36.	bottel	bottle
14.	lile	lie	37.	alikitcs	athletics
15.	paytions	patience	38.	thier	these
16.	fountane	fountain	39.	deseve	deceive
17.	thiale	thoroughly	40.	bool	bowl
18.	alowed	allowed	41.	exsamenshine	examination
19.	swoule	usual	42.	ronge	wrong
20.	vication	vacation	43.	lumb	limb
21.	addatod	attitude	44.	intaresting	interesting
22.	neew	knew	45.	farl	fare
23.	veatier	flutter	46.	sweped	swept

Form 11 - cont'd

47.	disapointed	disappointed
48.	cushen	cousin
49.	whoes	whose
50.	preped	prepared
51.	blude	blood
52.	atheletics	athletics
53.	leve	leave
54.	matial	material
55.	kenaw	knew
56.	jimnasam	gymnasium
57.	punes	pumps
58.	asosiate	associate
59.	boatle	bottle
60.	addmition	admission
61.	vakation	vacation
62.	exhamination	examination
63.	prepard	prepared
64.	fer	fare
65.	thes	these
66.	electrisaty	electricity
67.	founten	fountain
68.	asistants	assistance
69.	interting	interesting
70.	quatyes	quantities
71.	sost	lost
72.	vakcntcy	vacancy
73.	liey	lie
74.	uasel	usual
75.	stral	straw
76.	hoso	whose
77.	fummy	funny
78.	dissapointed	disappointed
79.	hrut	hurt
80.	deicieve	deceive
81.	boul	bowl
82.	lym	limb
83.	cosin	cousin
84.	soilde	soldier
85.	pickell	pickle
86.	licere	liquor
87.	soundi	sound
88.	patentions	patience
89.	whow	wore
90.	prinsiple	principal
91.	studtes	study
92.	obedent	obedient
93.	noule	whom
94.	atitude	attitude
95.	wong	wrong
96.	algebre	algebra
97.	sweept	swept
98.	thurale	thoroughly
99.	aload	allowed
100.	futter	flutter

APPENDIX C--concluded

TEST OF THE READABILITY OF MISSPELLED WORDS - FORM 14

Check classification: Male___ Female___ Student___ Teacher___

DIRECTIONS: Look at each word and try to decide what word was intended from its appearance and/or from sounding it out. Write only one word in each space. If you have absolutely no idea what word was intended, put a "O" in the blank space.

1.	curitiss	courteous
2.	fluterd	flutter
3.	capossity	capacity
4.	sodier	soldier
5.	inconvenation	inconveniance
6.	admittion	admission
7.	analicace	analysis
8.	fener	fare
9.	patronie	patronage
10.	usuall	usual
11.	anvantajust	advantageous
12.	agsamanasion	examination
13.	stratened	straightened
14.	vacancie	vacancy
15.	shedule	schedule
16.	cousen	cousin
17.	simultanious	simultaneous
18.	attitued	attitude
19.	unamious	unanimous
20.	disapointed	disappointed
21.	enfisixes	emphasizes
22.	alhwd	allowed
23.	assisants	assistance
24.	whoose	whose
25.	accociate	associate
26.	electrocity	electricity
27.	insegnifican	insignificant
28.	swepped	swept
29.	critisuim	criticism
30.	lim	limb
31.	algerba	algebra
32.	pation	patience
33.	deseve	deceive
34.	gimnasium	gymnasium
35.	comeparatly	comparatively
36.	prinsiple	principal
37.	physision	physician
38.	pikl	pickle
39.	spusificty	specifically
40.	afletics	athletics
41.	approximattley	approximately
42.	prepard	prepared
43.	rediclus	ridiculous
44.	miaterl	material
45.	suplamentiary	supplementary
46.	liquer	liquor

Form 14 - cont'd

47. peraies	prejudice	74. thouroghly	thoroughly
48. obeadiant	obedient	75. sweept	swept
49. therily	thoroughly	76. patranised	patronage
50. quontitys	quantities	77. lumb	limb
51. faly	fare	78. sheduell	schedule
52. decieve	deceive	79. picic	pickle
53. electricty	electricity	80. analyiss	analysis
54. aproximatly	approximately	81. perpared	prepared
55. solider	soldier	82. capasity	capacity
56. simaltaneous	simultaneous	83. ataletes	athletics
57. muttecal	material	84. younanous	unanimous
58. incenvins	inconveniance	85. uasule	usual
59. flunter	flutter	86. emphesises	emphasizes
60. compartly	comparatively	87. coozen	cousin
61. piecapil	principal	88. courtious	courteous
62. suplementary	supplementary	89. patantes	patience
63. whoes	whose	90. criticisum	criticism
64. spurcifically	specifically	91. liquior	liquor
65. atidude	attitude	92. advantagess	advantageous
66. phycision	physician	93. dissparonet	disappointed
67. quanties	quantities	94. algerbra	algebra
68. predujice	prejudice	95. obedent	obedient
69. examitation	examination	96. straightend	straightened
70. asistance	assistance	97. gymnasum	gymnasium
71. admison	admission	98. insignivecant	insignificant
72. rediculuss	ridiculous	99. vacantse	vacancy
73. alouded	allowed	100.ascosiate	associate

APPENDIX D

A SCOTTISH VIEWPOINT

Andrew V. Ewing

In any comparative study of educational systems, it is easy to take the apparent for the real. Few would assume, however, that merely descriptive accounts of a system give a wholly accurate picture of its values and purposes, its methods, and its results. Although to say so is platitudinous, it is perhaps worth reminding ourselves occasionally that educational ideals, aims, and techniques are to be found in individual teachers and not simply in text-books: and what is written about the classroom is frequently but a more or less accurate statement of what actually goes on within it from day to day. With considerable diffidence, therefore, does the writer presume to suggest the significance of the results of the present study. He is also acutely aware that his conclusions may not find universal acceptance in his own country. He can only plead that he has tried to relate the results to his own actual experience with educational practices in the two countries rather than to what others have written or said about them.

At the outset, a reference to the painstaking thoroughness of the investigators will be reassuring to Scottish critics and, at the same time, will be nothing more than a well-deserved acknowledgment of the meticulous care with which the project was planned and executed. In sampling, in the preparation and administration of the tests, and in the working out of the results, they displayed what to Scottish observers is typical American efficiency. Nor was their desire for objectivity less evident than their flair for organization and planning.

The investigators are well aware that during the past 50 years many changes have taken place in Scottish schools, although more obviously, perhaps, in the primary school. They would concede that there has been a remarkable shift of emphasis during this period. Although the content of the curriculum, as such, has not altered so very radically, there can be no doubt that the school itself has become child-centred rather than curriculum-centred. They do not, therefore, assume, as others have done, that Scottish methods are altogether too formal and too academic. But most would accept their statement that, on the whole, our approach to the learning situation is still somewhat more formal and academic than that which is, in general, adopted in the United States.

One might complain that there is a tacit assumption that the teaching methods employed in a particular subject at any given stage are identical throughout the whole country. This naive view is certainly not that of the investigators who carried out the study. Individual variations in method, in time-tabling, and in approach were quite evident even within the various schools from which the West Lothian samples were drawn. Nevertheless, it would probably be conceded that the fundamental similarities of schools as far apart as Bathgate and Aberdeen or Linlithgow and Glasgow would be greater than their superficial differences and that, over the greater part of the country, teaching methods and the approach to the child retain features which are traditionally Scottish.

Doubt has been expressed concerning the reliability of the test norms. For this reason, sampling was carried out in Jackson and in Pinellas County. In comparing the results, it will be borne in mind that the mean IQ's of the American samples are slightly superior to the Scottish samples and are not, therefore, wholly representative.

Turning first to the key subject of reading, the results on Gray's Oral Reading Test would appear to reinforce the opinion expressed by the

American investigators that in this subject - and evidently in others too - Scottish 5-year-olds make a brisk beginning and accelerate fairly quickly until they enter the junior department (stage P-III) at age 7. At all events, their mean score was significantly above both the test norm at age 7 and the mean score of the Jackson sample of the same age: nor was their mean score significantly below the norm when the latter was computed at 12 months above the mean age of the Scottish group. It would be reasonable, here at least, to assume the existence of a real difference in attainment. The reasons for the disparity are not too obscure. In the first place, the "tempo" of reading instruction in Scottish schools is considerably faster, certainly between the ages of 5 and 7: in the majority of the West Lothian schools in which testing was carried out, instruction began within a few weeks of the child's entering school. Secondly, there is a conscious attempt on the part of the teacher to give the child (by a combination of Phonic, Look-and-Say,and Sentence Methods) the basic technique with which to tackle new words and to break fresh ground for himself. Recourse to phonetic analysis is probably less frequent in American schools where a technique involving visual recognition and recall is more common. These differences in method might well explain, in part at least, the outcome of the tests of readability of spelling errors. Again, it has been verified empirically by the investigators that the rate with which new words of increasing difficulty are introduced into the text of the Scottish reading books which are most popular during the early stages is more rapid than that found in their American counterparts. Moreover, the investigators will probably agree that although the principle of reading readiness is by no means disregarded in Scottish schools, nor are individual and group methods uncommon, considerations relating to "growth" and individual differences have a more immediate effect upon American practice. One would, therefore, have expected to find the greater variance among the Jackson children at age 7, but in fact this was not the case, although the difference in the other direction was not significant. Finally, the investigators themselves referred earlier to Scottish methods which, by their very nature, lead to a somewhat greater amount of time being spent on oral reading than is the case in schools in the United States.

The performance of the Scottish children in the closely related subject of spelling would also appear creditable. Only at age 14, when the norms were computed at 12 months above the mean ages of the samples, were their mean scores not significantly superior. Again, the apparent differences in attainment might be directly attributable to those variations in method, pace, and emphasis which we have already discussed.

On handwriting, one comment will suffice. Precision and neatness generally and some degree of excellence in the spelling and handwriting skills in particular are still, in Scotland, placed high among the values which are regarded as reflecting the tone of a class and, by some, the effectiveness of a teacher. The scoring of the West Lothian pupils on the Metropolitan Handwriting Scale (if generous) is no more than any true Scot would expect!

In that the material calls for a number of specific abilities, the attainments of the Scottish children on the Stanford Paragraph Meaning subtest are of considerable interest. It might be assumed that reading fluency, apperceptive background, innate intelligence, and degree of maturation are among the factors which make for success on this test. The results show the mean scores of the West Lothian samples to be significantly above the test norms at ages 7 and 11 and to be significantly above the mean scores of the Pinellas samples at the same age levels. Their mean scores were, however, significantly below the norms for American children who were a year older and who had had a comparable amount of schooling. When comparison of the national groups is made at the same chronological age, one possible explanation of the Scots' apparent superiority might be suggested in terms of reading fluency and, with it, vocabulary: having commenced reading a year earlier, they have simply achieved greater mastery of the mechanics of reading. At all events, the achievements of the West Lothian pupils on Gray's Oral Reading Test might be taken as supporting evidence for this view in that the mean score of these 7-year-olds was significantly above the test norm and the mean score of the Jackson sample at age 7. Moreover, their mean score was not significantly below the test norm when the norm was computed at 12 months above the mean age of the Scottish pupils. From the Scottish point of view, however, much more noteworthy is the performance on the paragraph meaning test of the West Lothian pupils at age 14. At this age, the mean score of the Scottish children was significantly below the test norm and was significantly inferior to that of the Pinellas group of the same age. Several explanations, although tentative, might be advanced. In the first place, it has been suggested that the diminution of "formal reading" activities in Scottish schools after age 12 is greater than is the case in American schools: in the latter, reading as a school subject receives more attention until the 8th grade (age 13). Secondly, we might consider the view that the general reading of American children between the ages of 12 and 15 is more extensive: to an outside observer it would appear that in American schools generally there is much greater use made of school libraries and class libraries and that the extent to which pupils are encouraged to find out for themselves from reference books, dictionaries, encyclopedias, magazine articles, and so forth, is also greater than in Scotland. At least the point should be examined. Finally, it has been argued that, after the transfer stage at age 12, the average Scottish pupil is under considerably less "pressure" than hitherto, that this is more frequently the case in the junior secondary school, and that there is, consequently, a falling off in effort and in performance. This explanation, however, may be uncharitable not only to the Scottish pupils but also to the American 14-year-olds who excelled them on this test.

There remain the results of the test of word meaning and here again one may seek reasons for the apparent, if not in this case statistically significant, diminution of Scottish superiority at age 14. And it is precisely the tendency of this age group to, as it were, "lose ground" on this test and on other tests in the battery, which provides the central theme of the completed study.

The trend is more clearly discernible when we compare, on the one hand, the achievements of the Scottish children at ages 7 and 11 with, on the other, the performance of their older compatriots. On each test, the two younger groups score significantly above the norms and the means of the American samples. Again, except in the case of paragraph meaning (and, of course, handwriting, for which there are no comparable data) the mean scores of the Scottish 7-year-olds and 11-year-olds do not, in a statistically significant sense, fall below the norms when the norms are computed at 12 months above the mean ages of the Scottish samples. Moreover, in spelling, when the norms are so computed, the difference is still significantly in favor of the Scots. By contrast, the Scottish 14-year-olds are significantly below the norm and significantly below the mean score of the Pinellas sample on the paragraph meaning test; and, on word meaning, their mean score falls below that of their contemporaries from Pinellas, though the difference is not statistically significant. Again, in spelling and in handwriting the superiority of the Scots at ages 7 and 11 is not demonstrated to the same extent at age 14.

Speculation arising from these findings would not be wholly pointless. Do the Scots, in fact, lose ground after, say, age 11 or 12, as the findings suggest, or does the gap narrow simply because the American children are catching up? A plausible explanation would undoubtedly favor the second of these alternatives. One last comment: if the comparisons of variances are reliable, the tendency would appear to be that in the more formal skills (handwriting and, to a lesser degree, spelling) the Scottish children are more alike, whereas in those areas which are related more closely to apperceptive background (comprehension and vocabulary) they are more variable than their American cousins. Are we not here touching upon, on the one hand, the effect of drilling and repetitive methods and, on the other, the effect of a more heuristic approach derived from a longer recognition of maturational and developmental factors? Does the explanation of the apparent differences in performance of the national samples at ages 7 and 11 lie simply here? Would it be far from the truth to conclude that despite variations in pace, slightly divergent views about subject values (occasionally unobserved), and adherence to somewhat traditional ideas on method, the Scottish and the American teacher, each in her own way, achieve much the same result at the end of the day?

APPENDIX E

TABLE 199

PERCENTAGES OF AMERICAN AND WEST LOTHIAN SAMPLES GIVING CORRECT RESPONSE TO EACH ITEM OF STANFORD PARAGRAPH MEANING TEST

Item	Age 7		Age 11		Age 14	
No.	American	W.Lothian	American	W.Lothian	American	W.Lothian
1	98	92	75	83	95	93
2	82	82	92	94	82	74
3	86	83	67	58	91	90
4	82	88	89	89	93	83
5	89	86	78	68	86	73
6	75	82	95	92	83	82
7	80	79	87	91	97	97
8	80	88	74	76	74	86
9	80	83	72	78	89	95
10	69	83	89	86	53	70
11	50	72	57	46	90	84
12	65	77	67	68	88	79
13	75	81	83	80	89	77
14	63	74	79	82	70	86
15	56	64	92	97	75	76
16	63	65	61	89	92	83
17	77	79	74	91	86	76
18	69	54	83	71	88	82
19	65	72	62	69	73	65
20	67	67	61	76	89	85
21	58	54	35	54	86	81
22	55	60	72	72	82	77
23	56	64	66	66	85	82
24	54	55	70	63	65	70
25	50	57	84	81	70	73
26	44	57	77	84	80	81
27	40	41	80	75	59	31
28	36	50	77	84	64	58
29	41	61	56	50	55	50
30	43	49	80	76	79	66
31	48	59	67	70	73	61
32	41	35	58	55	84	76
33	50	45	65	60	47	53
34	32	37	63	31	78	74
35	27	37	85	73	73	66
36	38	45	50	87	28	30
37	31	42	71	66	62	48
38	27	47	61	51	25	34
39	27	34	47	41	71	58
40	45	45	71	75	77	41
41	36	37	70	63	69	44
42	21	29	63	71	57	42
43	34	30	50	44	56	33
44	28	42	43	38	35	21
45	20	30	38	32		
46	29	34	63	65		
47	23	28	60	56		
48	9	6	46	42		

APPENDIX E--continued

TABLE 200

PERCENTAGES OF AMERICAN AND WEST LOTHIAN SAMPLES GIVING CORRECT RESPONSE TO EACH ITEM OF STANFORD WORD MEANING TEST

Item No.	Age 7		Age 11		Age 14	
	American	W.Lothian	American	W.Lothian	American	W.Lothian
1	95	96	98	98	96	95
2	92	96	93	99	76	84
3	86	93	88	89	94	93
4	93	58	96	96	96	93
5	87	95	87	98	96	92
6	88	89	82	90	86	85
7	65	87	93	97	95	66
8	84	79	94	98	81	81
9	73	75	85	88	88	91
10	77	82	82	67	89	95
11	64	74	77	74	88	90
12	62	80	90	87	90	92
13	67	47	81	73	88	86
14	63	89	78	79	90	91
15	68	60	85	92	80	88
16	60	79	85	92	90	92
17	58	72	83	92	82	82
18	61	76	82	79	85	55
19	56	87	80	95	82	73
20	50	55	82	74	78	85
21	53	69	61	67	73	64
22	50	60	59	92	81	60
23	47	47	80	94	78	34
24	40	61	85	93	73	74
25	47	42	59	92	[illegible]	72
26	51	36	69	64	75	92
27	39	54	74	81	79	80
28	40	41	66	63	77	65
29	41	52	63	67	72	61
30	33	63	72	81	71	72
31	34	53	72	81	66	72
32	27	25	70	70	59	59
33	36	51	73	89	68	69
34	27	49	70	61	63	69
35	26	30	65	73	77	58
36	23	29	78	82	66	74
37	28	14	65	68	65	76
38	20	49	52	68	54	54
39			71	76	60	61
40			57	63	63	54
41			50	72	47	51
42			57	69	51	54
43			54	73	36	53
44			50	65	56	31
45			51	37	45	22
46			42	46	27	13
47			36	54		
48			43	81		

APPENDIX E--continued

TABLE 201

PERCENTAGES OF AMERICAN AND LEEDS SAMPLES GIVING CORRECT RESPONSE TO EACH ITEM OF STANFORD PARAGRAPH MEANING TEST

Item No.	Age 7		Age 11		Age 14	
	American	Leeds	American	Leeds	American	Leeds
1	85	79	74	81	94	96
2	64	74	88	84	75	89
3	66	69	61	56	87	90
4	37	61	89	60	91	88
5	71	55	72	60	78	50
6	57	54	93	84	79	81
7	47	52	87	76	95	97
8	38	62	76	70	67	88
9	47	47	69	66	86	91
10	34	57	85	80	50	70
11	23	37	54	40	81	81
12	36	49	67	55	82	77
13	51	50	76	70	82	73
14	24	35	73	69	78	79
15	22	24	91	86	74	73
16	25	37	50	81	90	85
17	42	45	63	74	80	69
18	29	34	76	64	83	82
19	18	38	52	62	63	75
20	31	37	56	69	84	83
21	24	37	32	48	78	82
22	20	35	66	62	77	86
23	21	31	61	49	69	79
24	15	25	64	51	60	71
25	19	31	78	70	65	72
26	11	21	69	69	72	86
27	8	16	68	63	44	33
28	4	16	71	66	56	61
29	11	23	50	43	49	55
30	14	18	73	73	70	75
31	11	26	56	62	60	63
32	11	20	47	48	76	63
33	10	22	60	48	43	49
34	12	17	51	28	76	68
35	9	7	81	55	72	74
36	5	18	50	48	25	29
37	9	9	66	52	66	55
38	8	18	51	45	28	46
39	6	8	41	29	69	41
40	9	16	59	51	67	49
41	10	13	59	41	57	56
42	4	12	47	44	47	46
43	9	12	37	31	46	39
44	8	10	32	32	28	28
45	3	6	24	23		
46	4	11	45	46		
47	6	9	38	36		
48	6	2	26	28		

APPENDIX E--concluded

TABLE 202

PERCENTAGES OF AMERICAN AND LEEDS SAMPLES GIVING CORRECT RESPONSE TO EACH ITEM OF STANFORD WORD MEANING TEST

Item No.	Age 7		Age 11		Age 14	
	American	Leeds	American	Leeds	American	Leeds
1	72	79	95	76	92	92
2	70	75	93	91	73	88
3	52	72	90	80	95	94
4	61	64	92	81	91	96
5	49	70	86	83	92	94
6	58	55	76	82	86	85
7	46	53	89	90	95	97
8	31	51	89	89	79	85
9	26	42	79	80	78	94
10	38	51	72	73	83	88
11	26	44	70	67	82	86
12	36	51	85	84	83	93
13	25	36	76	71	86	83
14	31	46	72	60	84	90
15	37	30	80	80	74	82
16	20	40	78	84	83	92
17	26	35	82	82	71	90
18	26	36	69	66	84	34
19	16	42	76	84	71	80
20	10	26	74	68	73	85
21	13	33	57	53	70	79
22	10	30	46	73	75	68
23	12	11	76	85	59	39
24	14	27	81	85	63	67
25	17	22	81	84	67	80
26	18	18	64	60	63	93
27	18	24	60	64	67	82
28	13	16	48	55	61	69
29	3	21	58	60	64	72
30	7	17	56	63	57	85
31	9	20	61	69	53	73
32	10	8	51	49	46	81
33	15	17	58	73	58	76
34	13	19	60	59	59	67
35	6	9	50	58	59	76
36	9	9	56	68	52	78
37	12	4	57	55	52	81
38	6	18	38	52	44	64
39			57	56	48	58
40			39	43	46	66
41			43	46	39	48
42			37	49	32	55
43			38	45	26	62
44			34	45	37	33
45			29	28	30	35
46			30	29	17	10
47			24	34		
48			28	45		

APPENDIX F

TABLE 203

COMPARISON OF FREQUENCY OF MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 7

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
write	240 - 1	172 - 1	14.92	13.05	1.87	1.45
bread	184 - 2	65 - 7	11.44	4.93	6.51	6.32**
basket	168 - 3	116 - 3	10.40	8.80	1.60	1.45
pencil	152 - 4	135 - 2	9.45	10.24	-0.79	0.72
short	145 - 5	58 - 9.5	9.01	4.40	4.61	4.90**
send	107 - 6	25 - 18	6.65	1.90	4.75	6.17**
garden	87 - 7	54 - 11	5.41	4.10	1.31	1.66
inside	77 - 8	68 - 6	4.79	5.16	-0.37	0.46
light	75 - 9	98 - 4	4.66	7.44	-2.78	3.20**
our	47 - 10	49 - 12	2.92	3.72	-0.80	1.21
night	44 - 11	89 - 5	2.73	6.75	-4.02	5.22**
ride	40 - 12	47 - 13.5	2.49	3.57	-1.08	1.74
little	37 - 13	37 - 16.5	2.30	2.81	-0.51	0.88
ran	36 - 14	6 - 23	2.24	0.46	1.78	4.14**
week	33 - 15	37 - 16.5	2.05	2.81	-0.76	1.33
her	26 - 16	44 - 15	1.62	3.34	-1.72	3.02**

TABLE 203--concluded

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
cake	24 - 17	58 - 8.5	1.49	4.40	-2.91	4.77**
ball	21 - 18	47 - 13.5	1.31	3.57	-2.26	4.04**
red	18 - 19	8 - 21	1.12	0.61	0.51	1.50
can	14 - 20	5 - 24	0.87	0.38	0.49	1.75
good	11 - 21	21 - 19	0.68	1.59	-0.91	2.33*
she	10 - 22	7 - 22	0.62	0.53	0.09	0.35
came	9 - 23	55 - 10	0.56	4.17	-3.61	6.69**
cow	4 - 24	17 - 20	0.25	1.29	-1.04	3.25**

APPENDIX F--continued

TABLE 204

COMPARISON OF FREQUENCY OF MISSPELLINGS OF JACKSON AND WEST LOTHIAN SAMPLES AT AGE 11

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
disappointed	369 - 1	134 - 9	4.53	4.07	0.46	1.09
thoroughly	367 - 2	203 - 3	4.50	6.16	-1.66	3.70**
patience	337 - 3	96 - 12	4.13	2.91	1.22	3.10**
assistance	335 - 4	71 - 17	4.11	2.16	1.95	5.10**
principal	329 - 5	72 - 16	4.04	2.19	1.85	4.89**
deceive	317 - 6	115 - 11	3.89	3.49	0.40	1.02
obedient	314 - 7	75 - 15	3.85	2.28	1.57	4.20**
attitude	311 - 8.5	197 - 4	3.82	5.98	-2.16	5.08**
gymnasium	311 - 8.5	182 - 5	3.82	5.53	-1.71	4.08**
liquor	310 - 10	286 - 1	3.80	8.68	-4.88	10.63**
algebra	286 - 11	230 - 2	3.51	6.98	-3.47	8.11**
associate	281 - 12	174 - 6	3.45	5.28	-1.83	4.54**
quantities	267 - 13	150 - 8	3.28	4.55	-1.27	3.28**
vacancy	265 - 14	116 - 10	3.25	3.52	-0.27	0.73
athletics	256 - 15	50 - 21.5	3.14	1.52	1.62	4.86**
admission	251 - 16	159 - 7	3.08	4.83	-1.75	4.56**

TABLE 204--continued

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
allowed	226 - 17	93 - 13	2.77	2.82	-0.05	0.15
usual	220 - 18	36 - 26	2.70	1.09	1.61	5.28**
examination	208 - 19	51 - 20	2.55	1.55	1.00	3.26**
electricity	207 - 20	80 - 14	2.54	2.43	0.11	0.34
whose	172 - 21	35 - 27	2.11	1.06	1.05	3.82**
material	159 - 22	58 - 19	1.95	1.76	0.19	0.67
fountain	158 - 23	32 - 30	1.94	0.97	0.97	3.67**
flutter	154 - 24.5	26 - 32	1.89	0.79	1.10	4.28**
soldier	154 - 24.5	22 - 33.5	1.89	0.67	1.22	4.80**
pickle	151 - 26	39 - 24	1.85	1.18	0.67	2.54*
swept	115 - 27	18 - 36	1.46	0.55	0.91	4.12**
cousin	107 - 28	33 - 29	1.31	1.00	0.31	1.37
limb	96 - 29	47 - 23	1.18	1.43	-0.25	1.09
prepared	95 - 30	38 - 25	1.17	1.15	0.02	0.09
whom	91 - 31	11 - 43	1.12	0.33	0.79	4.07**
fare	84 - 32	34 - 28	1.03	1.03	0.00	0.00
knew	82 - 33	22 - 33.5	1.01	0.67	0.34	1.73

TABLE 204--concluded

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
vacation	70 - 34	70 - 18	0.86	2.13	-1.27	5.59**
wore	69 - 35	10 - 44	0.85	0.30	0.55	3.22**
pumps	64 - 36	17 - 37.5	0.79	0.52	0.27	1.56
interesting	61 - 37	50 - 21.5	0.75	1.52	-0.77	3.81**
straw	57 - 38	15 - 42	0.70	0.46	0.24	1.47
lie	56 - 39	16 - 40	0.69	0.49	0.20	1.23
wrong	53 - 40	16 - 40	0.65	0.49	0.16	1.00
leave	51 - 41	17 - 37.5	0.63	0.52	0.11	0.69
blood	49 - 42	16 - 40	0.60	0.49	0.11	0.71
these	47 - 43	20 - 35	0.58	0.61	-0.03	0.19
bowl	40 - 45	28 - 31	0.49	0.85	-0.36	2.26*
battle	40 - 45	8 - 45	0.49	0.24	0.25	1.88
hurt	40 - 45	6 - 47.5	0.49	0.18	0.31	2.37*
study	24 - 47	7 - 46	0.29	0.21	0.08	0.75
funny	16 - 48	6 - 47.5	0.20	0.18	0.02	0.22
lost	13 - 49.5	4 - 49	0.16	0.12	0.04	0.99
sound	13 - 49.5	3 - 50	0.16	0.09	0.07	0.50

APPENDIX F--concluded

TABLE 205

COMPARISON OF FREQUENCY OF MISSPELLINGS OF JACKSON
AND WEST LOTHIAN SAMPLES AT AGE 14

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
criticism	329 - 1	218 - 4	3.88	4.53	-0.65	1.81
simultaneous	323 - 2	236 - 3	3.81	4.91	-1.10	3.03**
emphasizes	310 - 3	295 - 1	3.66	6.14	-2.48	6.58**
inconvenience	288 - 4	161 - 12	3.40	3.35	0.05	0.15
prejudice	284 - 5	258 - 2	3.35	5.37	-2.02	5.64**
advantageous	283 - 6	142 - 13.5	3.34	2.95	0.39	1.22
analysis	277 - 7	163 - 11	3.27	3.39	-0.12	0.37
comparatively	275 - 8	168 - 10	3.25	3.49	-0.24	0.74
ridiculous	264 - 9	138 - 15	3.12	2.87	0.25	0.81
supplementary	259 - 10	207 - 5	3.06	4.31	-1.25	3.75**
approximately	258 - 11	128 - 18	3.02	2.66	0.36	1.19
thoroughly	255 - 12	136 - 17	3.01	2.83	0.18	0.59
courteous	247 - 13	181 - 7	2.91	3.76	-0.85	2.66**
unanimous	240 - 14	137 - 16	2.83	2.85	-0.02	0.07
physician	233 - 15	142 - 13.5	2.75	2.95	-0.20	0.67
specifically	228 - 16	180 - 8	2.69	3.74	-1.05	3.37**
deceive	222 - 17	82 - 25	2.62	1.71	0.91	3.36**

TABLE 205--continued

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
patronage	220 - 18	78 - 27	2.60	1.62	0.98	3.66**
schedule	206 - 19	182 - 6	2.43	3.79	-1.36	4.46**
obedient	199 - 20	81 - 26	2.35	1.68	0.67	2.58**
straightened	183 - 21	71 - 30	2.16	1.48	0.68	2.74**
insignificant	173 - 22.5	116 - 19	2.04	2.41	-0.37	1.40
patience	173 - 22.5	57 - 32	2.04	1.19	0.85	3.60**
capacity	157 - 24	77 - 28	1.85	1.60	0.25	1.05
principal	155 - 25	62 - 31	1.83	1.29	0.54	2.36*
disappointed	152 - 26	94 - 21	1.79	1.96	-0.17	0.70
assistance	150 - 27	37 - 37	1.77	0.77	1.00	4.69**
attitude	147 - 28.5	88 - 23	1.73	1.83	-0.10	0.55
allowed	147 - 28.5	42 - 36	1.73	0.87	0.86	4.02**
liquor	141 - 30	174 - 9	1.66	3.62	-1.96	7.13**
quantities	132 - 31	53 - 33	1.56	1.10	0.46	2.17*
athletics	122 - 32	15 - 40.5	1.44	0.31	1.13	6.17**
associate	120 - 33	104 - 20	1.42	2.16	-0.74	3.18**
pickle	118 - 34	9 - 48	1.39	0.19	0.20	1.14
vacancy	113 - 35.5	90 - 22	1.33	1.87	-0.54	2.43*

TABLE 205--concluded

Test Word	Frequency and Rank of Errors		Percent of Total Errors		Difference	t
	Jackson	W. Lothian	Jackson	W. Lothian		
gymnasium	113 - 35.5	85 - 24	1.33	1.77	-0.44	2.01*
admission	104 - 37	74 - 29	1.23	1.54	-0.31	1.49
whose	97 - 38	47 - 34.5	1.14	0.98	0.16	0.86
soldier	91 - 39	10 - 46	1.07	0.21	0.86	5.48**
examination	89 - 40	13 - 43.5	1.05	0.27	0.78	4.94**
fare	84 - 41	5 - 50	0.99	0.10	0.89	6.01**
algebra	76 - 42	47 - 34.5	0.90	0.98	-0.08	0.46
swept	65 - 43	20 - 39	0.77	0.42	0.35	2.43*
electricity	64 - 44	13 - 43.5	0.76	0.27	0.49	3.58**
flutter	59 - 45	12 - 45	0.70	0.25	0.45	3.41**
material	57 - 46.5	15 - 40.5	0.67	0.31	0.36	2.71**
usual	57 - 46.5	10 - 47	0.67	0.21	0.46	3.59**
prepared	44 - 48	14 - 42	0.52	0.29	0.23	1.93
cousin	35 - 49	8 - 49	0.41	0.17	0.24	2.33*
limb	29 - 50	24 - 38	0.34	0.50	-0.16	1.40

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